THE GLASS INDUSTRY

VOLUME 21, NUMBER 9, SEPTEMBER, 1940

THROATLESS TANK WITH SUSPENDED BACK WALL IMPROVES FIBERGLAS MELTING

Novel design of rebuilt melting furnace at its Newark, Ohio, plant helps Owens-Corning Fiberglas Corp. in its quest for low production costs.

Fiberglas and its products, the curiosity of only a few years ago, continues to find new uses and to enter new markets that affect the lives of ordinary citizens more and more. This process has gone on until the coined term "Fiberglas" has come to be a hall-mark for products that feature quality and dependability.

But this satisfactory progress in the markets has not been made without extraordinary efforts along the line of manufacture and distribution, as well as inventive genius and practical development. And it must be remembered that, in almost every stage of their practical exploitation, the products must meet the competition of comparatively cheap natural fibers and materials. An important feature of Fiberglas products is controlled quality and the manner in which this feature is assured was the subject of an article on Fiberglas batch preparation, published in THE GLASS INDUSTRY in August, 1939.

In the matter of production costs, which determine so definitely the economic status of Fiberglas as well as its competitive position, the problem reverts to a manufacturing question pure and simple, and a very difficult one because of the pioneering nature of the operations. Faced with new materials, new equipment and new machinery, the plant organization must still seek economy of operation, as well as quality of results, and the job is not easy. Under such conditions, long steps into more or less uncharted channels of glass making might be expected, and the recently rebuilt "C" furnace lives up to these expectations.

Unfortunately for the Owens-Corning seeker after reasonable melting costs, the glass which can be made into fibers with the necessary properties is one that imposes great difficulties on conventional equipment. Without going into the technological reasons and considering the glass simply from the melting operation standpoint, it may be said that this glass devitrifies quite easily under certain conditions and that it is extremely corrosive in the checkers. As the previous campaign neared its close, the throat in "C" furnace was practically closed to the flow of glass, the throat area being restricted by great masses of devitrified material which appeared as in Fig. 1 when the tank was drained for rebuilding. And during this campaign a repair of some part of the checkers was necessary every three months or so, due to the corrosive action of the carry-over.

Knowing that the two sorest spots in the melting operation were in the throat of the tank and in the carry-over of batch, the pioneering gentlemen at Newark decided characteristically to eliminate both of them and the results after several months of operation of the rebuilt "C" tank show that their decision was justified. The new furnace has not a sign of a throat and the batch enters a covered doghouse for sintering before being exposed to the flame in the melting area of the tank.

Fig. 1. One of the sources of trouble in the old Owens-Corning "C" tank was the deposition of quantities of devitrified material in the throat, almost closing the opening.

Fig. 2. Looking toward the front inside the furnace, three of the four ports on the right side can be seen. Flux wall and first two ports are of Corhart; other two ports of Sillimanite.

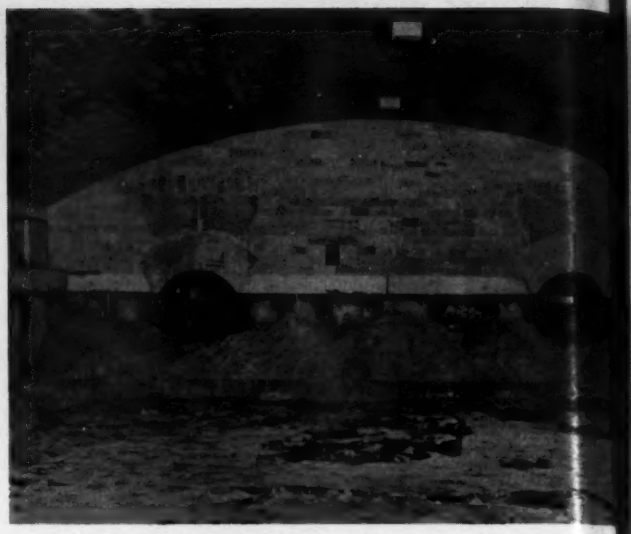


Fig. 3. The bridge wall and the throat have been removed and the depth at the front end reduced to 2 ft. Two openings in the front wall carry glass to the forehearths.

The redesign also included a change in the tops of the checker chambers and the port necks, together with a redesign of the channels leading from the furnace to the machine forehearths. The drawings for the new furnace, and the suspended back wall, were furnished by Frazier-Simplex, Inc., the actual construction being done by the Newark plant organization.

The old furnace bottom was used again and widened slightly. The top of the old checker chamber was flat and this was replaced by an arched roof, thereby necessitating some decrease in the checker depths, but improving the flow of gases through the checkers and into the ports. There are four ports on each side of the furnace, each 30 in. wide, and Fig. 2 shows the details of three of the ports on one side looking toward the front of the tank. Corhart blocks were used in the two ports on each side nearest the doghouse, the others being made of sillimanite. Burner blocks for high-pressure gas burners can also be seen in this view. Each port was also furnished with a baffle wall and burner openings for low-pressure burners, but the furnace is now operated on high-pressure natural gas exclusively.

The inside width of the furnace is 17 ft. and from the back of the doghouse to the front wall is a distance of 31¼ ft. The depth from bottom to top of flux wall at the rear end of the furnace is 3 ft. and this depth continues up to a point slightly less than four feet from the front wall, at which point the depth is reduced to two feet. Two openings in the front wall lead the glass to the machine forehearths and Fig. 3 shows these openings together with the raised bottom level at the front end of the tank. It will also be noted from this and other views that the entire flux wall is constructed of Corhart blocks.

In the forehearths the molten glass flows over the surface of specially designed distribution blocks which have holes to lead the glass to the machines below. The glass level in the tank is carried about 1 in. below the flux line and the distribution blocks in the forehearths are located so that the depth of glass over them is about two inches. The change in level from the bottom of the tank openings to the top of the distribution blocks is accomplished by means of special sloping blocks which can be seen in Fig. 3. Skimmer blocks are also placed in each channel leading to the forehearth, the skimmers being made necessary by the absence of the bridge wall in the tank.

Fig. 4 is a close-up of one of the forehearth roofs while under construction. Each forehearth is heated by a couple of high-pressure gas burners at the front end, the products of combustion passing up a stack at the rear end near the front wall of the furnace. This view was taken looking toward the furnace and shows the stack opening in the forehearth roof, with bricks to be

Fig. 6. The bottom of the Frazier-Simplex suspended back wall forms a cover for the wide doghouse at the rear end of the tank.

Fig. 4. A close-up of a forehearth roof and stack during construction.

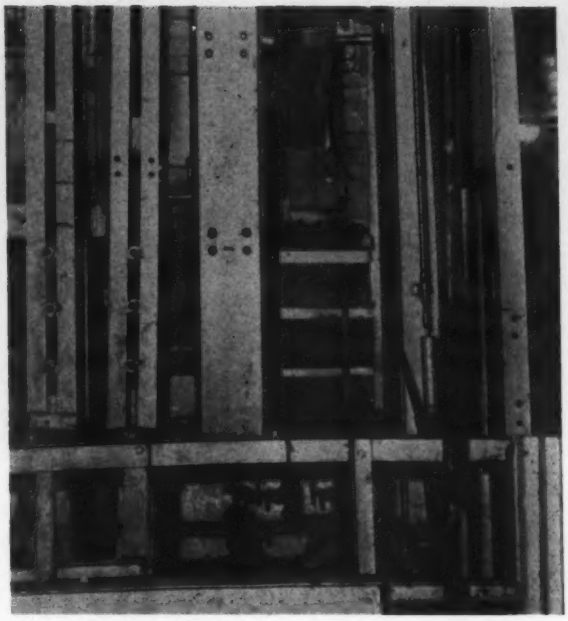


Fig. 5. This outside view of the furnace shows the covered passage through which glass flows from the tank at the left to the forehearth at the right. Each passage is provided with a skimmer.

used in the stack piled in readiness nearby. Fig. 5 is another view of furnace and forehearth taken from the side. Here the front end of the furnace appears at the left, the rear end of the forehearth at the right, and the passage from the furnace to the forehearth in the center. The skimmer block fits into this portion of the passage and can be replaced without disturbing furnace or forehearth.

At the rear end of the tank the charging bay, or doghouse, extends back about 2½ ft. from the main furnace and is about 8 ft. wide. This area is covered by the bottom of the Frazier-Simplex suspended back wall, as shown in Fig. 6, the bottom of the wall being a little over a foot above the tops of the Corhart blocks which form the side walls of the doghouse and furnace. The suspended back wall also appears in Fig. 7, this view showing the inside corners of the doghouse and furnace. The back wall consists of special refractory shapes which key into each other and are supported by a steel framework.

An outside view of the back wall and the rear of the doghouse is shown in Fig. 8. Here the individual air-cooling system for the back wall can be seen, together with the water-cooled openings through which the batch is charged into the space between the glass level in the doghouse and the bottom of the suspended back wall. In this view can also be seen a bricked-up square opening through which cullet is fed to the furnace, as will be explained later. The picture was made while the furnace was being heated up and before the batch chargers were in position, of course.

In operation the rear end of the furnace appears as in Fig. 9. The three chargers are in position directly in back of the doghouse and at the right of the picture, the outer two chargers receiving batch through chutes from a small bin above and the center one handling cullet. These chargers are of the screw type with water-cooled tubes and were built by Owens-Illinois at Alton. Each charger is driven by an individual motor through a P.I.V. variable speed mechanism. The chargers are easily portable and can be withdrawn from the furnace quickly for inspection or repair.

A view of the ports and regenerators on the right side of the furnace is shown in Fig. 10. An interesting feature of these parts of the furnace is the use of Fiberglas Insulating Cement on the brickwork, a ¼-in. coating being placed on the port necks and a full 1-in. layer on the walls of the checker chambers. The cement coating acts to prevent infiltration of cold air, improves the ap-

Fig. 7. Another view inside the tank at the rear shows one end of the suspended back wall, a corner of the doghouse, and a corner of the melting zone of the tank.

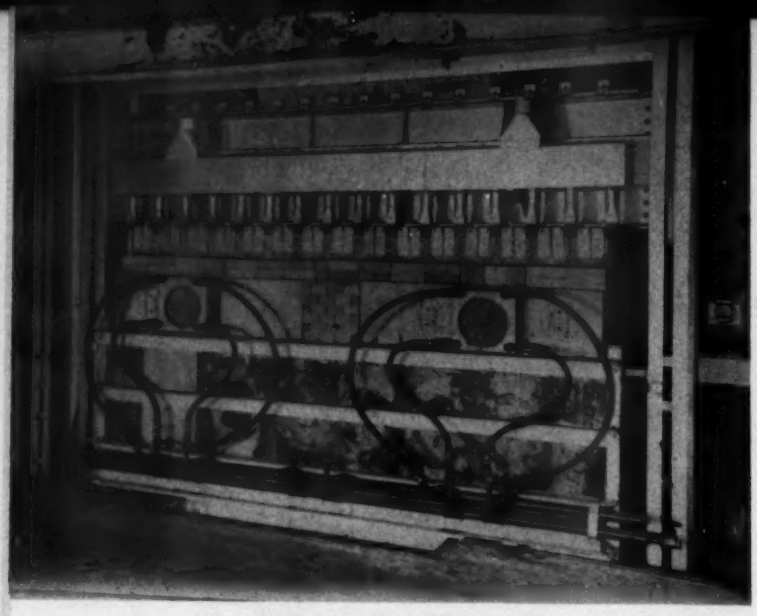


Fig. 8. This view shows the rear of the doghouse and the suspended back wall while the furnace was being heated up. The back wall has its own individual air-cooling system. Also shown here are two of the water-cooled entrance boxes for the furnace chargers.

pearance of the furnace parts, and provides good thermal insulation for the checker chambers. The cement is a standard product of the Fiberglas company and is produced in the form of a powdered material that is made into a plaster by the addition of water and then applied in rather thin coats to the surface of the brickwork.

The main natural gas line for the furnace rises through the charging floor near the back wall of the building and divides into two branches, each of which is controlled by a quarter-turn lubricated plug valve and serves the burners on one side of the furnace. One of these lines can be seen in Fig. 11, descending to the roof of the checker chamber where it is connected to a horizontal section running alongside the furnace beneath the port necks. As stated previously the furnace was piped for the combustion of either low-pressure or high-pressure gas. At each side of each port a branch leads from the horizontal main to both a low-pressure and a high-pressure burner, the low-pressure burner passing straight through the port side wall and the high-pressure burner at the end of the branch passing diagonally through a special burner block. Flow of gas to either burner is controlled by a small plug valve and at present the high-pressure arrangement is used. The furnace is reversed every 20 minutes.

Natural gas coming to the furnace from the outside mains is measured and controlled by a Foxboro "Stabilog" gas recording meter and pressure control apparatus. Other instruments used in the operation of the furnace include a 6-in. Hayes water manometer for stack draft and a 10-point Foxboro recording pyrometer. Natural draft is used exclusively. Unlike most glass melting furnaces, the temperature gradient rises from the back of the melting zone to the forehearth.

From the early days of the commercial production of Fiberglas the disposition of waste material or cullet has been a problem. In the story on the batch-handling system for this plant, published in THE GLASS INDUSTRY last year, one of the illustrations showed the light, fluffy material being tucked into the doghouse by means of a pitchfork. But for the new "C" furnace an entirely new system for handling the fibrous cullet has been developed and, on the whole, is operating satisfactorily. This system includes a shredder in the production department where the cullet originates, a cyclone-type separator, and automatic feeding apparatus at the furnace.

The cyclone arrester is located on the roof of the plant directly above the rear of the furnace, and from the top of the device a pipe leads to the inlet of a large fan located at ground level beneath the charging floor. This fan inlet pipe is the top one of the two pipes appearing in Fig. 12, the other drawing shredded Fiberglas from the production department into the cyclone arrester. From the arrester the shredded cullet drops by gravity to the feeding mechanism shown at the rear of the tank in Fig. 9, the lower end of the vertical pipe appearing at the upper left in the picture and the cullet passing an inspection window just before it reaches the horizontal screw conveyor. The screw conveyor is driven by motor and chain as shown and delivers the cullet to the middle one of the three tank chargers which, in turn, delivers the material to the furnace. The total amount of cullet does not run more than 6 or 7 per cent of the total melt.

A small proportion of the light fluffy pieces of material are not removed by the present cyclone arrester and are carried through the inlet to the fan. In order to prevent spreading this cobwebby stuff all over the plant and its vicinity, the outlet of the fan is led into a "pent-house," as shown in Fig. 13. In this view the fan appears near the base of the structure at the left and the air discharged from the fan finally escapes to the atmosphere through the fine-mesh screen at the top of the sheet metal enclosure. To most glass men the fiberglas cullet system will be quite unique, since most plants do not have to fuss with the kind of cullett that may be blown about if not held down.

The new furnace now melts at a rate of about 6¼ sq. ft. of melting area per ton, the production rate being set by the capacity of the production unit taking glass

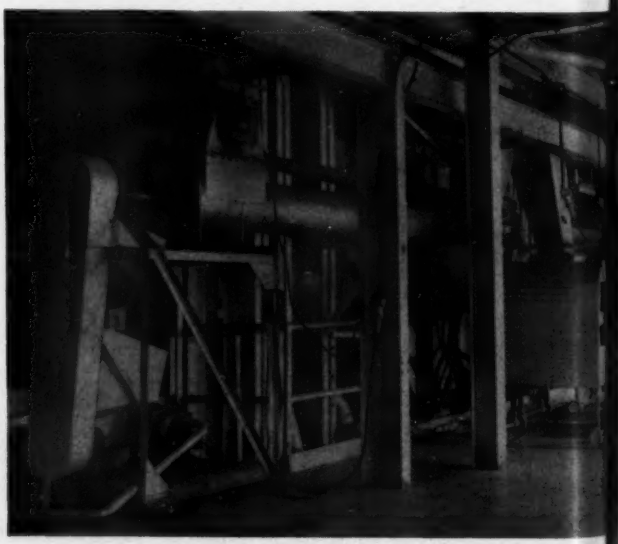


Fig. 9. As the rear of the rebuilt "C" furnace appears in operation. Two screw-type chargers receive batch from a bin above and deliver to the doghouse. Shredded fiber cullet comes down through the vertical pipe at the upper left and is delivered to the center charger by a long horizontal screw conveyor.

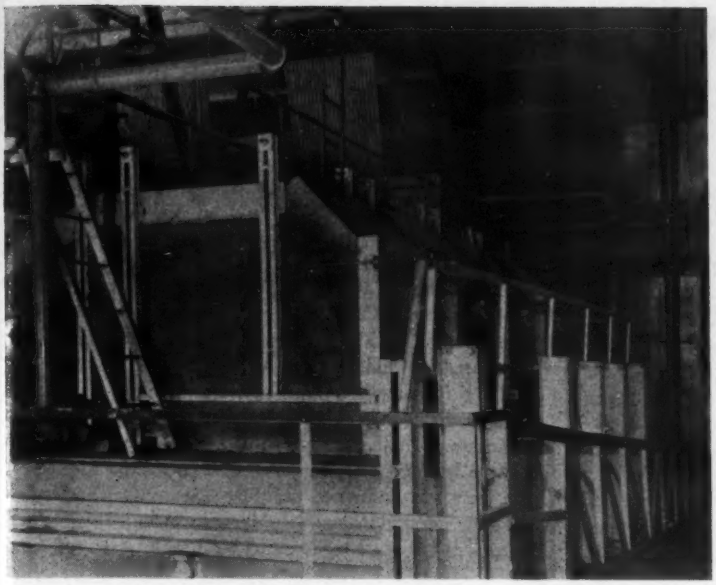


Fig. 10. The port necks and checker chambers are covered with Fiberglas Insulating Cement to prevent infiltration of cold air and provide thermal insulation.

from the forehearths. It has reached a rate of 5.5 sq. ft. and can go to five if necessary. Compared to the old furnace, the new design has reduced the fuel required per ton of glass melted by about 15 per cent, thus producing a nice saving in fuel costs and justifying the changes in design of furnace and ports. There has also appeared a great reduction in the amount of hot repairs necessary to keep the checkers in condition. There is evident a much smaller carry-over of corrosive materials since the installation of the suspended back-wall and covered dog-house, indicating that the batch must be pretty well sintered as it reaches the melting zone and in such shape that it does not pass out with the draft into the checkers. With a saving in furnace maintenance costs, as well as fuel, the new "C" furnace is doing its part of the job that Owens-Corning sets for itself—savings in manufacturing costs that may be passed along to its customers.

Fig. 12. The top pipe is connected to the suction of a fan and draws shredded cullet into the cyclone arrester through the other pipe. From the arrester the cullet falls by gravity to the feeder at the rear of the furnace below.

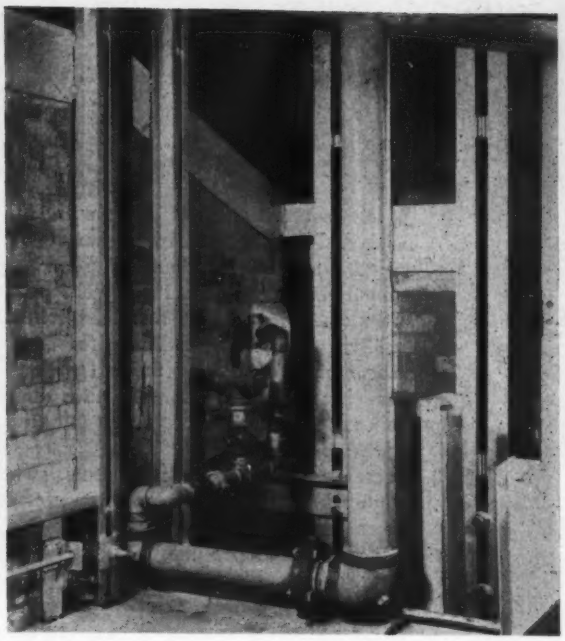
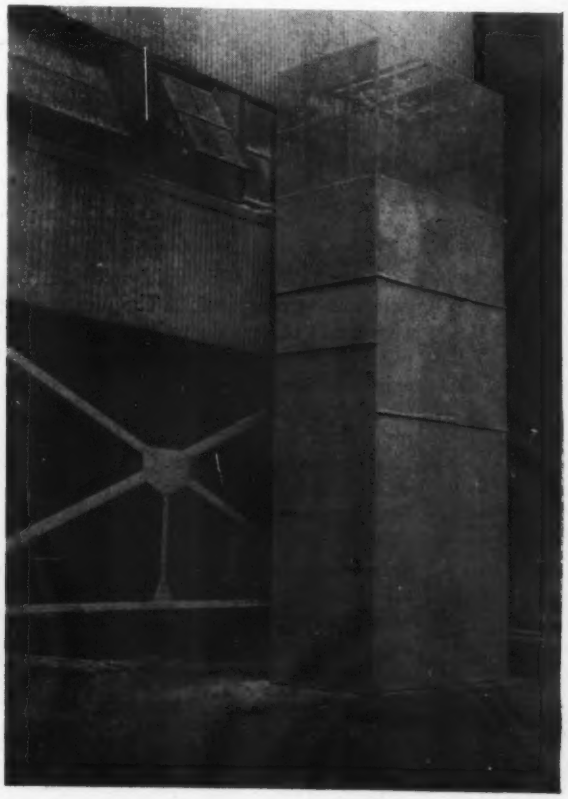


Fig. 11. Natural gas for the burners is piped from a manifold that passes down each side of the furnace. Arrangements are made for burning either low-pressure or high-pressure gas.

Fig. 13. Since a few small particles of cullet are not removed by the cyclone arrester, the outlet of the fan is led into a "pent-house" with a screened top.



FLOW MEASUREMENTS IN THE GLASS INDUSTRY

By A. J. MONACK[1] and E. E. BEETON

Western Electric Co., Vacuum Tube Shop

Flow measurements are of value in the glass industry in several ways. Such measurements are an extremely accurate method for duplicating and controlling fires using liquid or gaseous fuels. The proportions of fuel and air are metered to form the combustible mixture. Duplication of flow conditions for any purpose or the measurement of flowing fluids (gas or liquid) can be done cheaply and conveniently, thus achieving maximum economy and efficiency.

Methods of Measuring Flow. Three methods are in general use for flow measurements. The orifice meter (Figure 1) utilizes the reduction in pressure when a fluid passes through a thin-plate orifice with a hole whose diameter is not more than 60 per cent of the pipe inside diameter. With high fluid velocities there is considerable net pressure loss. The Venturi meter, or gauge, (Figure 2) utilizes the reduction in pressure when a fluid passes through a constricted throat. With the proper exit cone the net pressure loss should not exceed one-sixth of the differential pressure. The flow nozzle (Figure 3) may, for our purpose, be considered a modification of the orifice meter. The Venturi nozzle is somewhat similar to the Venturi tube shown in Figure 2. Pitot, or impact tubes may be used, but practical difficulties make these less convenient than the other meters.

Indicators, recorders and integrators may be used with all of the primary devices mentioned above. In many cases, however, the need for these secondary devices does not justify their cost. For metering gases a simple indicating device (see Figure 4) consists of a U-tube filled with dibutyl phthalate and another U-tube or a cistern-type manometer. Water is ordinarily used instead of added to the product to give absolute pressure. The co-

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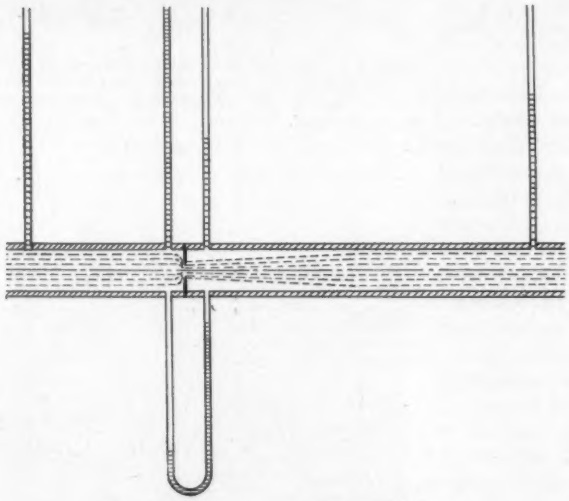


Fig. 1. Thin-plate orifice in pipeline.

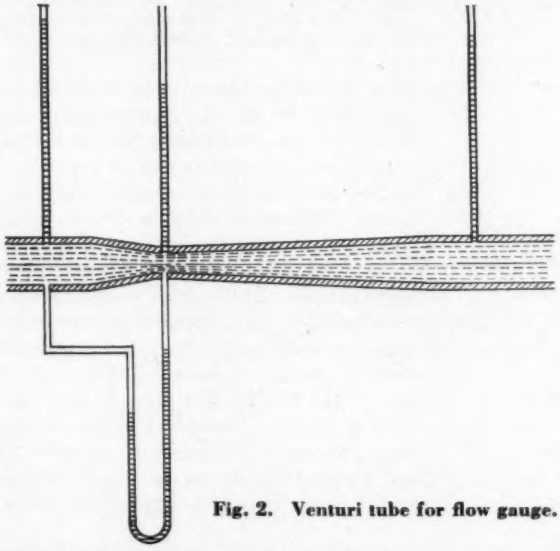


Fig. 2. Venturi tube for flow gauge.

the phthalate, but since the specific gravity of the latter is 1.050 the readings in inches may be considered the equivalent of inches of water. This gauge measures the differential, that is, the difference in pressure between the up-stream pressure and the pressure at or below the point of constriction. This term is usually designated *h*, and is expressed as inches of water. The other U-tube (or a cistern) is merely a manometer to record the down-stream pressure after recovery from the effect of the constriction. This is measured in inches of mercury. The difference between up-stream and down-stream pressures, which represents the net pressure loss, is not essential to the flow computations.

Computation of the Flow. The computation of flow is not a difficult matter. The formula for gases, reduced to its simplest form, is

$$Q = C\sqrt{hP}$$

where Q = flow in cubic feet per minute (multiply by 60 for cubic feet per hour)
h = differential in inches of water
P = absolute pressure in pounds per sq. in.
C = a constant

The term *h*, as explained before, is the difference between the up-stream pressure and the pressure at or just below the constriction. It is evident from Figure 1 that the value of *h* will depend upon the location of the pressure tap. The largest differential will result, of course, when the tap is placed at the point of lowest pressure. The least differential (between up-stream and down-stream taps) will measure net pressure loss. The term P is a measure of the absolute static down-stream pressure expressed in pounds per square inch. The readings on the mercury gauge in inches are converted to pounds per square inch by muliplying by 0.49. 14.7 is

efficient C must be determined experimentally or furnished by the manufacturer, and it must be corrected for conditions of flow other than those for which it was determined.

The formula for volume flow of a liquid is

$$V = K G \sqrt{h}$$

where V = rate of flow of liquid (unit determined by value of K)
G = correction factor for specific gravity
h = differential in inches of water
K = a constant

The value of K is furnished by the manufacturer.

Installation of Flow Gauges. Certain precautions must be observed in the installation of flow gauges. The following are the chief points to bear in mind.

1. The length of straight pipe between the up-stream tap and a right-angle bend in the same plane (a single elbow) should be not less than 10 pipe diameters; between the down-stream tap and a right-angle bend in the same plane not less than 4 pipe diameters.

2. Between the up-stream tap and a bend in two planes (a horizontal and vertical elbow in succession) the straight pipe should be not less than 20 pipe diameters.

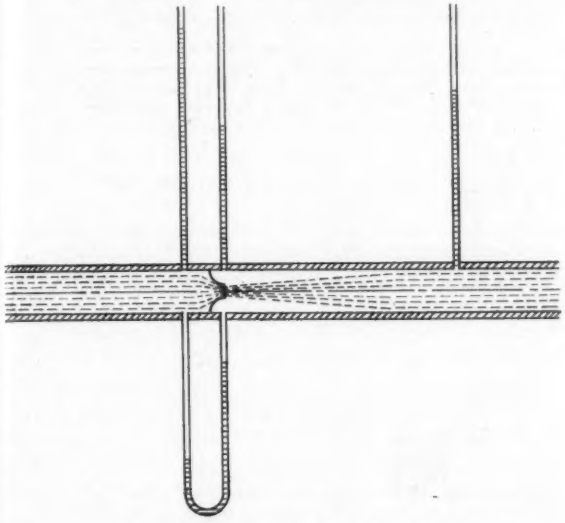


Fig. 3. Flow nozzle in pipe line.

3. The length of straight pipe between the up-stream tap and a reducer or swedge must be no less than 8 pipe diameters; and no less than 4 diameters between the down-stream tap and a reducer or swedge.

4. Between the up-stream tap and a valve (globe or gate) the length of straight pipe must be no less than 25 pipe diameters.

When physical limitations make the above distances impossible, straightening vanes must be used. Of course, if the gauges are used merely to duplicate fire-settings, flowing volumes, etc., without regard to actual measured quantities of gases, the precautions given above have little meaning provided every detail of the installation remains unchanged.

Flow Gauges for Small Lines. Flow measurements on one-inch or larger gas lines offer little difficulty. Meters can be purchased already calibrated. For small pipe lines, such as one-quarter and one-eighth, the matter is not so simple. Consequently, the authors found it advisable to design and calibrate Venturi gauges for their special needs, and these can be used generally for small flows.

Two requirements were to be met in the design of these gauges: (1) the net pressure loss was to be low, and (2) the differential pressures were to be large enough for accurate reading at normal rates of flow. The Venturi tubes shown in Figures 5 to 8 met both of these requirements.

These tubes have three pressure taps. The up-stream conical section shows an angle of 6° 50′. The differential gauge is connected across the tap shown at this end and the throat tap. The remaining tap (below the conical section showing an angle of 5°) is the down-stream, or static pressure, tap.

Calibration of Venturi Gauges. Venturi gauges (or any flow devices) are most readily calibrated by measuring the time required for a given volume of fluid to pass through the meter. When a gas is used corrections must be made for pressure, temperature, and humidity of the gas. The time required will of course be different for each different gas.

The Venturi gauges shown in Figures 5 to 8 were calibrated by passing the various gases through the meter first and then into a container of known volume filled with water. The time required to displace the water was measured. The values of the constant C were computed by using the equation given above for gases. Thus, $C = Q/\sqrt{h\,P}$. These values (with an accuracy of approximately 5 per cent) are as follows:

VALUES OF THE CONSTANT C

	Type of Gas			
Venturi Size	*Oxygen*	*Air*	*Hydrogen.*	*City Gas*
1/16″	0.025	0.026	0.10	0.032
3/32″	0.046	0.048	0.18	0.058
1/8″	0.076	0.080	0.29	0.095
9/64″	0.095	0.10	0.35	0.12

These values of C are based on the volume of gas which has flowed through the meter (cubic feet per minute) expressed in terms of 60° F. and 14.7 pounds per square inch. If the volumes are to be expressed in other terms C must be multiplied by $\frac{14.7}{\text{new pressure}}$ and by $\frac{\text{new temperature} + 460}{520}$ or by either one in case only one base is changed. If the temperature of the flowing

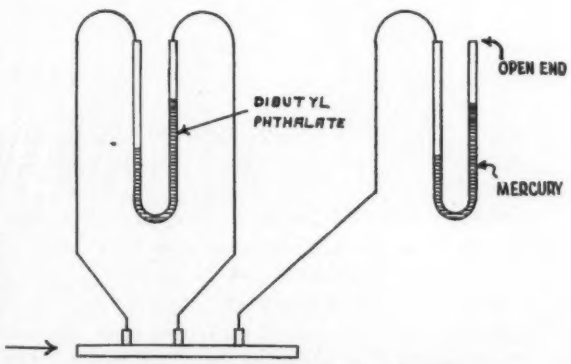


Fig. 4. Flow indicating device for gases.

gas differs from 60° F. (on which the above values of C were computed) the new coefficient is equal to

$$\sqrt{520/(T+460)}\ C,$$

where T is the new temperature of the flowing gas.

Fire Setting. Cross-fire (groups of one to six or more individual burners on each side of the glass to be heated), fan-shaped fires, fish-tails, etc., all find application in the lamp and tube industry, laboratory glass-working, factory operations of cutting, fire-polishing cut edges, and others too numerous to mention. In some of these operations fire-settings are critical; in all of them ease

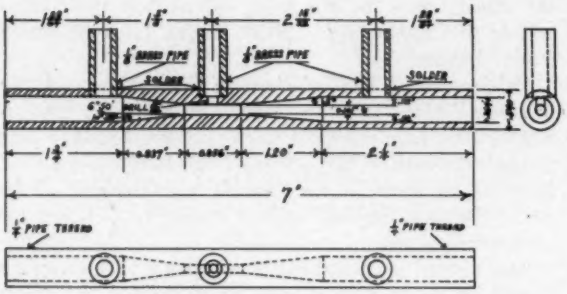


Fig. 5. 9/64" Venturi Tube.
The pressure taps must be flush with the inside of the pipe and there must be no leaks in the soldered joints.

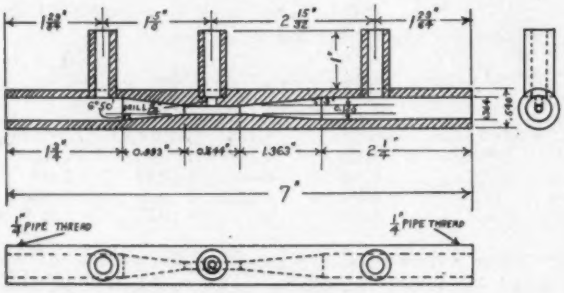


Fig. 6. 1/8" Venturi Tube.
Set pressure taps flush with inside of pipe and there must be no leaks where taps are sealed into the tube. Use 1/8" pipe for pressure taps.

of duplication of correct settings is advantageous. Hence the need for flow measurements is evident.

Fire-setting involves three variables (with three secondary variables), and these are:

1. The temperature of the flame, which is controlled by the proportions of the gases used.
2. The length of the flame, which is controlled by the pressure of the gases.
3. The location of the flame, both with respect to movement along a fixed vertical line and movement in a plane horizontal to this fixed line.

The secondary variables are:

a. The kind of glass used
b. The thickness of the glass
c. The shape of the glass

Stated in another way, these six factors mean that with a certain glass of a given thickness and shape reproducible fire settings can be specified by requiring given proportions of the gases used, given pressures for the gases, and given vertical and horizontal displacements for the burners. Displacements can be controlled by means of a target or by specified distances from fixed reference points. Pressures can be measured accurately by means of ordinary manometers of the U-type or cistern type. The proportions of the gases used for combustion can be controlled by means of flow meters.

It is evident that considerable savings in time and improvement in quality of the product are certain to result from careful fire control. Human judgment is fallible

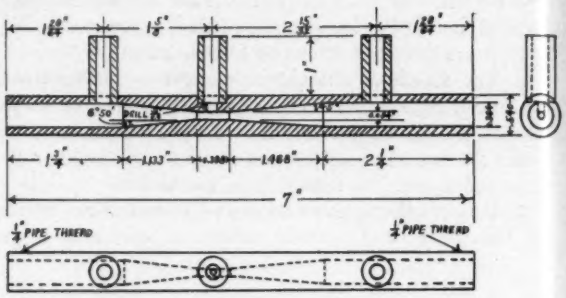


Fig. 7. 3/32" Venturi Tube.
Set pressure taps flush with inside of pipe and there must be no leaks where taps are sealed into the tube. Use 1/8" pipe for pressure taps.

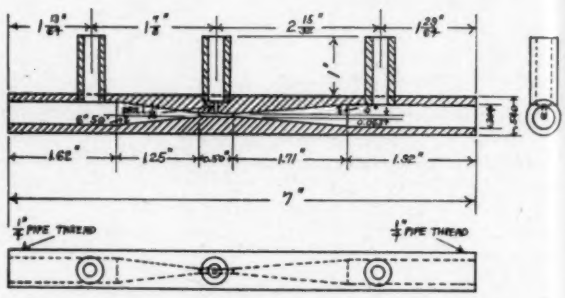


Fig. 8. 1/16" Venturi Tube.
Set pressure taps flush with inside of pipe and there must be no leaks where taps are sealed into the tube. Use 1/8" pipe for pressure taps.

and is not always consistent. These lapses can and do result in inferior output for varying periods of time. With high rates of production the dollar loss is no unimportant item. Proper fire-setting in many glass operations eliminates one source of unnecessary losses.

Conclusion. The value of flow-measuring devices has not been fully appreciated in the glass industry. The designs given here for Venturi tubes make relatively easy the use of flow gauges in small gas lines. The cost is not excessive. Economies may result in the purchase or manufacture of such Venturi tubes if dimensional tolerances are given limits commensurate with the necessary accuracy of process control. Gauges of this type need not even be accurately calibrated if the sole object is the duplication of settings rather than careful measurement of flow.

• Gordon Herrold, manager of the Salem, N. J., plant of Anchor-Hocking Glass Corp., has been transferred to Lancaster. Paul Hirshfield is now Salem manager.

KYANITE AS A GLASS STONE

W. R. LESTER
Maryland Glass Corporation

Various investigators have shown that kyanite is decomposed, on heating, to mullite and a siliceous liquid. Peck[1] found that at cone 10 (1305°C; 2381°F) little conversion took place, while at cone 13 (1350°C; 2462°F) the conversion was very pronounced. Greig[2] in his studies of the formation of mullite from kyanite found that kyanite was slowly decomposed at a temperature of 1335°C (2435°F), the decomposition becoming more rapid as the temperature was increased. At a temperature of 1410°C 2552°F) a sample of kyanite was completely decomposed to mullite plus silica in 15 minutes. The existence of unaltered kyanite in the form of a glass stone, therefore, seems highly improbable when it is considered that most glass furnaces are operated at temperatures of 2600 to 2800°F, which is a few hundred degrees above the lowest conversion temperature of kyanite.

For the past year or so, when the determination of the source and cause of stony glass has been necessary, it has been our practice to take a large number of samples, for example, 50 to 100 stones, for the microscopic examination. The samples are then examined with the petrographic microscope, using a low power, and the stones separated into their various kinds or types. Thin sections or powder examinations of the various groups are then made as usual. From the collective data so obtained, a much more accurate picture of the source and cause of the stones may be drawn than is possible when only a few stones are examined.

Since the adoption of this grouping procedure, we have occasionally observed stones that were composed of either unaltered kyanite grains or partially altered kyanite grains. These "kyanite stones" usually appear roughly rectangular in shape and show the typical cross-cleavage cracks that are characteristic of kyanite. Small areas where the typical fibrous intergrowths of mullite and glass are present are sometimes seen in the stone. Those grains that are largely undissociated check very well with the optical properties of kyanite such as extinction angles, refractive index, and cleavage. In the case of those that are partially converted, the areas with the greatest divergence in optical properties show the greatest amount of mullite growth. Examples of these stones are shown in Figs. I and II. In all cases the microphotographs are of the stone as it exists in the glass and do not represent thin sections. In most cases the stones show little or no solution by the glass.

During a recent siege of stony glass, several hundred stones were examined by the group method. The type grouping was predominantly stones composed of mullite or corrundum with or without nephelite, and a much smaller group consisting of unaltered or partially altered kyanite grains. The general shape of the mullite stones was very similar to the shape of the kyanite stones. Fig. III. As several examinations by the grain immersion method of the raw materials used in the batch failed to show material such as clay or high index minerals, along with the general opinion that kyanite as kyanite cannot exist in the glass at the usual glass furnace temperatures, the raw materials were eliminated as the source of these stones and attention was focused on a high-alumina super-refractory which was being used as a cover block for the bridge wall in the furnace.

This type of block is made from material which in its original state is kyanite. The kyanite is calcined at a temperature of about 2600°, thus converting the original kyanite to mullite. After calcining, the material is crushed, ground, and screened to various sizes, mixed with refractory ball clay, formed and refired to a temperature around 2700°F. Inasmuch as the kyanite as found in the glass showed little or no glass solution and little conversion to mullite, it was felt that its source must be some position in the furnace, which was not only low in temperature, but also situated very close

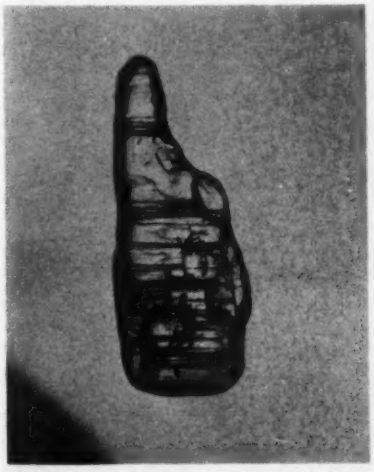


Fig. I. Kyanite glass stone, showing no conversion to mullite.

Fig. II. Kyanite glass stone, partial conversion to mullite at one end.

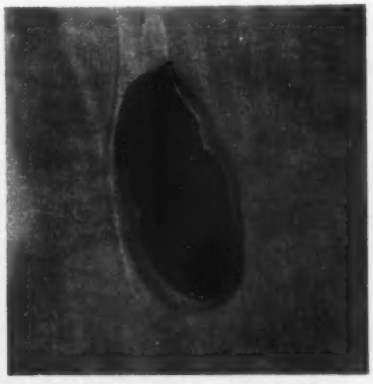


Fig. III. Mullite stone, shape similar to the kyanite grains. Shows some solution and nephelite rim when examined in thin section.

to the feeder inlet. As the bridge wall cover block was the only point in the furnace that met these conditions, it was deduced from the available evidence that these blocks were responsible for the stony condition, the deduction being that some of the original kyanite grain had not been converted during manufacture and that these grains plus the converted mullite grains were being washed over into the working end of the furnace.

While the furnace was in the stony condition it was tapped and drained, and production was changed from colored glass to flint glass. All other conditions, such as furnace temperature, glass pull and the like remained the same as before, but the stony condition immediately disappeared and with it disappeared our theoretical deductions.

The batch materials used for the flint and colored glass were identical except for the sand. In the flint glass, a high-grade glass sand is used, while a local, washed, dried and screened high-iron sand is used for the colored glass. The local sand was again checked by the grain-immersion method and particular care was taken to look for minerals of high refractive index. The results were again negative. These consistently negative results obtained by the grain-immersion method seemed to indicate that if any contaminating material were present in the sand, it must be present in very small amounts and possibly was escaping detection due to the limitations (as far as the amount of material that can be examined is concerned) of the method being used.

Larger samples of sand, namely 50 to 100 grams, were then floated by the means of bromoform and the heavy minerals were collected. Microscopic examination --Figs. IV and V—of the heavy-mineral material showed the presence of kyanite, mica, and various iron-bearing minerals. The amount of kyanite in the original sample of sand was found to be approximately 0.25 per cent and the grain size of the heavy minerals was found to be finer than 30-mesh. The size, shape and character of the kyanite grains in the heavy mineral material were identical with those found in the glass.

Grains of kyanite were then separated from the heavy minerals and heated at about 1300°C for six hours. The grains, after this treatment, showed a partial conversion to mullite and the destruction of some of their original optical properties (Fig. VI). This indicates that some of the mullite stones found in the glass, particularly those having outlines similar to the kyanite grains, have their source in the sand. Rough tests have also been made on the solubility of the heavy minerals in molten sodium carbonate. A one-gram sample of the heavy-mineral material after being fused with five grams of sodium carbonate at a temperature of 1000°C for eight minutes showed approximately 80 per cent solution, the residue consisting of nearly equal parts of iron-bearing minerals and kyanite of large grain size. Longer fusion time results in nearly complete solution.

All of the theoritical evidence still seems to indicate that grains of kyanite, if present in the batch, should dissolve in the melt long before they reach the feeder, and in the case of those that might escape solution, their density should allow them to sink in the glass and either dissolve in time or be converted to mullite. This experience has shown, however, that it is quite possible for a kyanite grain after entering the doghouse, to ride through the furnace and exist in the finished glass in the unconverted condition. Furnace pull, temperature and glass-flow currents no doubt influence this possibility.

[1]A. B. Peck, *J.A.Cer.Soc.*, 8, 7, 407, 1925
[2]J. W. Greig, *J.A.Cer.Soc.*, 8, 8, 465, 1925

COMMERCE DEPT. FEATURES GLASS

To demonstrate the progress that the glass industry in the United States has made in the development and improvement of its products, the U. S. Department of Commerce has established an imposing display of glass and glassware in the lobby of its building at Washington, D. C. Practically every type of glass product is shown, including containers, fibre glass, block, boards, etc.

The main feature of the exhibit is a display consisting of 22 sets of bottles, demonstrating the reduction in weight made by container manufacturers during the past few years. Each set contains one modern and one old-style bottle, the former contains from 6 to 55 per cent less glass.

H. B. McCoy chief of the Specialties Division, has sponsored the exhibit. Mr. McCoy reports that thousans of consumers have inspected the glassware.

Fig. IV. Heavy mineral material. Transparent, rectangular grains are kyanite. Taken in ordinary light.

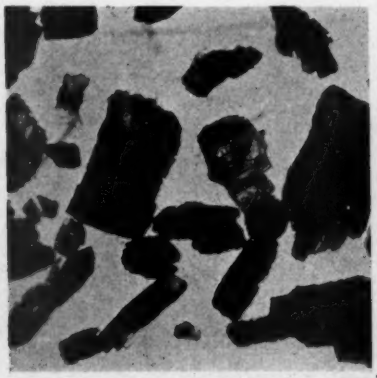


Fig. VI. Kyanite after heat treatment. Grains have lost their transparency and show partial conversion to mullite.

Fig. V. Same field as Fig. IV. Nicols crossed.

GLASS DIVISION TO MEET AT HERSHEY

The 12th fall meeting of the Glass Division of the American Ceramic Society will be held at the Hotel Hershey, Hershey, Pa., September 6 and 7, as announced in the August issue of the GLASS INDUSTRY. The program promises to hold much interest to the visiting glassmen and their ladies, both by the practical technical sessions and the entertainment "Chocolate Town" has to offer.

On Friday morning, the sixth, registration and committee meetings will open at 9 a.m. The technical sessions will begin at 2 o'clock in the afternoon. The scheduled papers are as follows:

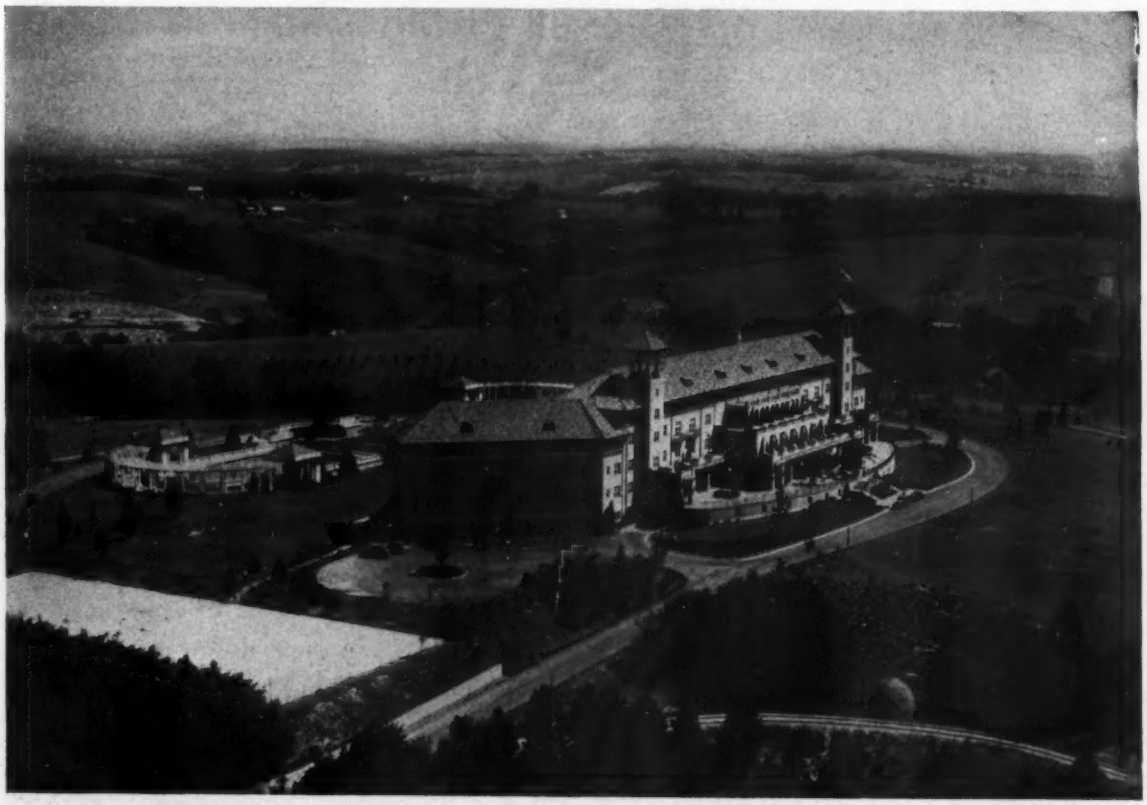
1. "The Effect of Surface Tension on the Rate at Which One Glass Will Diffuse in Another Glass", W. B. Silverman.
2. "The Homogeneity and Heterogeneity of Commercial Glass," F. W. Preston, J. C. Turnbull.
3. "Notes on the Flaking of Glass Containers", W. R. Lester.
4. "Some Observations on the Chemical Durability of Glass", A. K. Lyle, D. E. Sharp.

On Saturday morning, the meetings will get underway at 9:30 with the following scheduled papers:

1. "Upward Drilling", F. W. Preston, J. C. Turnbull.
2. "A. S. T. M. Report on Chemical Analysis of Glass", G. E. F. Lundell.
3. "Report of Committee C-14 A. S. T. M. Activities", Louis Navias.

No formal program has been arranged for Fridey evening. Saturday afternoon will see the golf tournament on the Hershey links. The tournament this year will be conducted under the pari mutuel system. A handicap system, supervised by the vigilant S. R. Scholes, offers full opportunity for golfers of varying degrees of skill. Arrangements have been made for non-golfers to visit points of interest in and around Hershey. The Glass Division banquet will also be held Saturday evening and this will be followed by dancing at the Hershey Park Ballroom.

Hershey is but 14 miles east of Harrisburg, on Route 422. Those who plan to go by rail should notify the Hotel as to arrival time at Harrisburg and transportation to the Hotel will be provided at one dollar per person. The hotel has granted special rates for the Glass Division meeting: $9.00 per day for a single room and $8.00 per day per person for double occupancy. This rate is on the American Plan and includes garage accommodations for those who arrive by motor. Reservations should be made by writing the Hotel Hershey, Hershey, Pennsylvania, mentioning the Glass Division Meeting.



HERSHEY, PENNSYLVANIA, WHERE THE GLASS DIVISION WILL MEET THIS SEPTEMBER

Hershey was founded by the late M. S. Hershey, chocolate king of America. His ambition to build a model factory in a model town was achieved in 1903, and the nearby community is one of the remarkable show places of this country.

WPA PRODUCING DECORATIVE GLASS

The descendants of Caspar Wistar throw away their picks and shovels and turn to making beautiful glassware at Vineland, N. J.

It was announced in the May issue of the GLASS INDUSTRY that the WPA was planning to establish a glass factory, the purpose being to reclaim workers from pick and shovel jobs and restore them to skilled trade with which they are familiar. Today, after a lapse of only a few months, the project has become a reality, and the workers are turning out some really fine pieces of decorative glassware.

The unit is located at Vineland, New Jersey, only a few miles from Alloway where Caspar Wistar in 1740 started the first really successful glass making enterprise in America. Known then as Wistarburgh, the community became world-famous for Wistar-ware which today is highly prized among glass collectors.

Some of the WPA workers at Vineland are said to be direct descendants of men who worked with Wistar. According to State WPA Administrator Robert W. Allen, craft secrets developed by these pioneers have been handed down from father to son and now, after two hundred years, are being used to produce the beautiful glassware depicted in the accompanying illustrations.

The restoration of these men to glassblowing was announced to be one of the primary reasons for establishing the Vineland project. Another inducement was an idle factory where only a few years ago glass products were turned out with an annual gross value of a million and a half dollars. The former owner of the factory is a supervisor of the WPA unit.

Vases and tumbler, splashed with color. This speckled and seedy ware is said to be far superior to the Mexican product which is being brought into this country on such a large scale at present.

In recapturing their glass-blowing skill, the workers are not overlooking colors. Besides the clear glass, they are at present working with amber, amethyst, blue, green, ruby, milk, yellow and mixtures called seedy and speckled. Color combinations developed are revealed in tiger lily vases. These ornaments have been blown to the natural colors of these lilies so common in New Jersey. The same lily design has been used in delicate blues and greens, offering a matching or contrasting color scheme for any flowers that may be placed in the receptacles. One of the most popular products is a Mexican drinking cup. It closely resembles the old-fashioned American gourd cup and is blown from one piece of glass with an air chamber to give the effect of a double bowl. A novel jug is blown from one piece of glass and reveals real skill

Lilies, native to the state of New Jersey, are blown in their natural colors and also in delicate blues and greens.

(Above). Goblets and Mexican drinking cup. The latter resembles the old American gourd cup. Blown from one piece of glass, it contains an air-chamber that gives the effect of a double bowl.

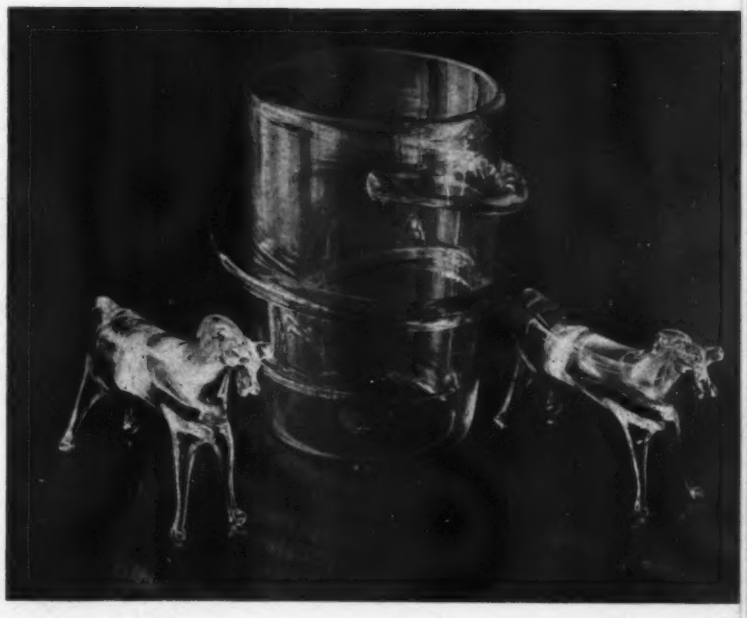
(Upper right). Note particularly the carafe at the right, which contains a pocket for ice. Water is put through the opening at the top and is cooled when it surrounds the ice pocket.

(Right). Bowl and shallow dish in color, showing the skill of the WPA glass artisans at off-hand work.

on the part of the craftsmen. An inset blown into one side forms a pocket in which to place ice. Water is put into the jug through an opening in the top and is cooled when it surrounds the ice pocket.

All the Vineland products are made by free-blowing or offhand to a drawn design or to a pattern of their own fancy. Molds are also used to produce low relief designs in slabs or solid shapes. Objects produced include vases, urns, goblets, bowls, dishes, jugs and scores of other shapes. Purely decorative subjects include prancing horses and many other spirited pieces.

None of the Vineland products can be sold in competition with private industry, WPA rules provide. Objects created there will be exhibited and turned over to public institutions. Stained glass will also be made at Vineland. Much of the stained glass used by artists is imported and, according to WPA sources, fear is entertained that because of world conditions, the supply may be soon running low. The stained glass to be made at Vineland will be used in two studios operated by the WPA in New Jersey.



Artistic vase and ornamental horses, the latter strongly reminiscent of the Czech and Bohemian ware, so common before the war.

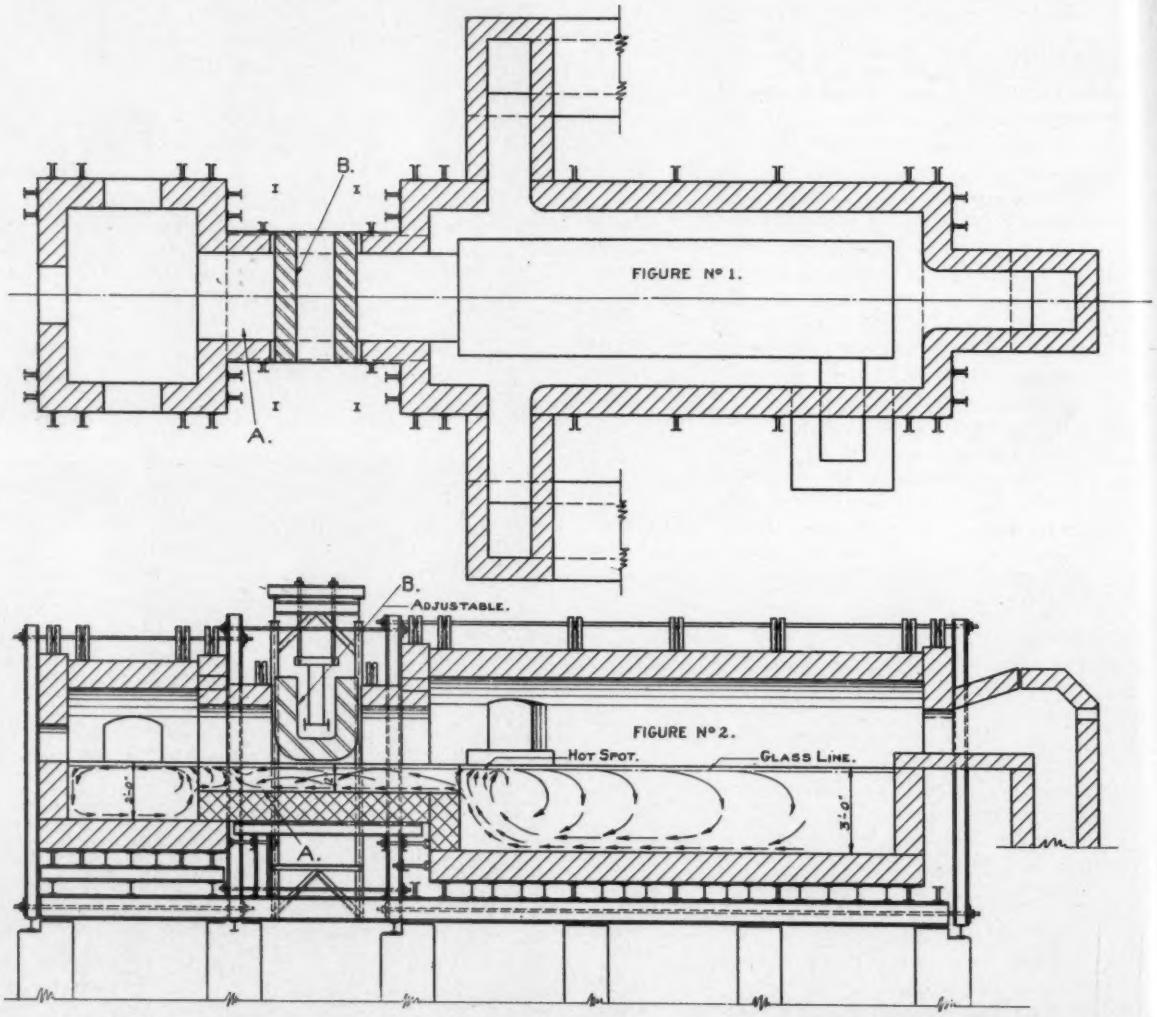
THE SIMPLEX CHANNEL TANK

Frazier-Simplex Inc., Washington, Pa., has recently announced an improved patented method for making clear, homogeneous glass in continuous tank furnaces. Although the method is not confined to small units, it is said to be particularly suitable for the manufacturer whose quality requirements are high and whose production requirements are low.

Because small continuous tanks have been none too efficient and have lacked the flexibility required by the small manufacturer, the use of day tanks has become more and more widespread. The Simplex Channel Tank is said to approximate the flexibility of the day tank and yet have the efficiency and melting economy of much larger continuous tanks of conventional design. Its features of construction are such that it will permit more glass of a given quality to be cleared out of a given area of melting space than has been possible before. These tanks, usually end-fired, have proven efficient as small units where a diversified line of colored glasses, as well as flint or crystal, had to be melted from time to time in the same tank, such as in the manufacture of high-quality photo-plate and opthalmic glasses.

The Simplex Channel Tank differs from the conventional continuous tank in that the throat is eliminated and the melting chamber is somewhat longer and narrower than in conventional designs. The flow of glass from the melting chamber to the working chamber is restricted both horizontally and vertically by means of a channel that is somewhat narrower and shallower than either the melting or working chambers and is situated between the two, as indicated in the accompanying diagram. This channel is located at the top of the tank and is open on top. The shallower, narrower, and longer this channel or "open throat" is constructed, the less hot glass flows into the working chamber and the cooler the glass in that chamber. The required planing or cooling to absorb the gasses remaining in the glass is accomplished principally in the channel.

Above this channel, or "open throat," is located the Simplex Adjustable Shadow Wall, extending the width



Pan and longitudinal section of the new Simplex channel tank, showing adjustable shadow wall.

of the channel and adjustable vertically to act as a damper to control the temperature in the working chamber. This tank construction has the great advantage, according to the manufacturer, that the hot spot can be drawn farther away from the doghouse or charging bay than on tanks of conventional design, thus increasing the effective melting area from 25 to 50 per cent. The adjustable shadow wall is indicated at B and B′. Most efficient operation is secured when the hot spot is adjacent to the entrance of the channel, thus utilizing the maximum of available melting area. The channel and shadow wall combination is said to make this possible without excessive temperatures in the working chamber.

This construction practically eliminates a recirculation of glass from the working chamber to the melting chamber, thus preventing undesirable remixing of refined and unrefined glass in the melting chamber. This function is performed by the mechanical restriction of the channel proper, with regard to the lower portion of the glass, and the ability of the shadow wall to throw a ribbon of radiated heat across the shallow bath at the channel entrance, thus reversing the flow of the surface glass and acting as a skimmer between the melting and working chambers.

The temperature of the glass in the shallow channel is said to be substantially uniform and the rate of movement of the glass in this chamber is almost entirely dependent on the rate of pull at the working chamber. This pull at the working chamber causes an entrainment of the more dense and refined glass flowing in vertical currents at the channel entrance, while the hotter surface glass is diverted at this point and caused to flow toward the rear of the melting chamber where it becomes entrained with the lateral and spiral currents existing in this body. The manufacturer states that this effecive separaion of the two chambers permits high melting efficiency and obviates the hazard of pollution common to many tank designs. Further, the many disadvantages of the conventional throat are eliminated, especially when a tank must be used for melting colored glasses.

The flexibility of this tank has been demonstrated by one manufacturer who has successfully and economically produced glasses ranging from water-clear photo-plate and high-quality mirror blanks to blues, ambers, and black or smoke glasses of high opthalmic quality. These tanks are adapted to operation with a shallow metal line due to the fine control of temperatures in the melting chamber. They are readily drained for quick change-overs from one color to another and the only alterations necessary are the applications of more or less insulation to the channel and working chamber as the operation may require. This feature is also of advantage where the operation may range from a soft lime glass with pressed machine operation to boro-silicate glass on thin blown operations.

Following the trend of many tableware manufacturers away from pot furnaces and day tanks, the Simplex Channel Tank is said to offer unusual adaptability for the economical production of quality glass ranging from three tons per day upward. Depending upon the size of the tank, preheating of combustion air is provided through either recuperator or regenerators. The recuperator used is of the horizontal tube, updraft type and it is stated the service life of all refractories used in this type of tank construction has been satisfactory.

RESTRICTIONS ON BOHEMIAN GLASS

Notices of the Minister of Commerce of the Protectorate of Bohemia and Moravia, valid to December 31, 1941, subject the expansion of glass production in Bohemia and Moravia to permit requirements of the Ministry of Commerce. Word of this comes to the United States through the American Embassy in Berlin and is released to the press through H. B. McCoy, chief of the Specialties Division of the Bureau of Foreign and Domestic Commerce.

These Notices cover the production of hollow glass and lead crystals; the refining of hollow glass and lead crystals; the production of glass instruments and of glass for chemical or pharmaceutical purposes; the production of vacuum bottles; of sheet glass; production and refining of crude glass for imitation jewelry and notions; and the manufacture of glass fibers.

The restrictions apply to the erection of new plants, the initiation of new lines of production by mills and refiners, the capacity increase of mills in operation, and the resumption of operations by mills which have been idle for periods ranging from one to two years, or for six months in the case of glass fibers.

It is believed that the main purpose of these restrictions is the coordination between the Sudeten and the Old Reich glass industries on the one hand with those of the Protectorate of Bohemia and Moravia on the other hand. Similar restrictions are existing in the German Reich proper for the purpose of coordinating production and to avoid an industrial expansion based on a typical war boom, mainly as far as hollow glass is concerned. In the case of notions and other branches of the glass industry that have depended largely on exports, the avoidance of a "mechanization" of the industry at the expense of skilled and artistic labor is understood to be the aim underlying the present restrictions. Incidentally, similar restrictions had been in effect in Czechoslovakia during the years of the economic depression and were prompted by the decline in exports of a greatly over-expanded industry.

NEW BOOK ON GLASS

Industrial literature is to receive an important addition this Fall in the form of a book on glass. The work, embracing not only every phase of the manufacture and the myriad uses of glass but also its history from ancient times to the present, is being prepared by Charles J. Phillips, sales manager of the insulation division of the Corning Glass Works. It will be brought out by the Pitman Publishing Company, of New York, and is to be fully illustrated. The publication date has not as yet been announced.

CORNING BUILDS AT WELLSBORO, PA.

A contract has been let to The H. K. Ferguson Company by the Corning Glass Works, to design and construct a warehouse at the Wellsboro, Pennsylvania, plant. The building is to be one story, 60′ x 260′, corrugated steel, steel sash, and concrete floors. The warehouse will be used for the storage of glass Christmas tree ornaments. This item has recently been added to the Corning Glass line to replace the foreign supply, now largely cut off by war conditions.

CURRENT STATISTICAL POSITION OF GLASS

Activity in the glass industry during July dropped below June's level following the usual seasonal pattern. Production, employment and payroll estimates followed this general trend; exports continued strong and imports maintained their recent reduced volumes. According to the GLASS INDUSTRY Production Index, output during July was estimated at $28,000,000, reflecting increase in window glass and glass containers and decreases in plate and miscellaneous glass products. Production during the first seven months exceeded $202,000,000, which indicates that this year's volume is running about 15 per cent ahead of last year and within 10 per cent of 1937's record figure.

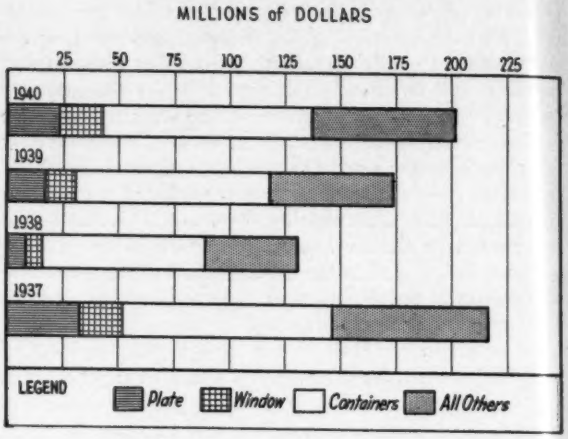
Plate glass production during July totaled 8,521,803 square feet, according to the Plate Glass Manufacturers of America. This represented a decline of 13 per cent from June, which is in line with the usual seasonal trend; compared with July of 1939, it was an increase of 37 per cent. During the first seven months of 1940 plate glass output totaled 87,127,000 square feet—34 per cent greater than last year's comparable total.

Window glass production during July increased 9 per cent over June to 993,678 boxes, establishing a contra-seasonal trend. This was 44 per cent greater than July of last year. Output during the first seven months of 1940 exceeded 7,613,000 boxes, which indicates that this year's volume is running 37 per cent ahead of 1939.

Glass container production during July amounted to 4,780,000 gross, according to the Glass Container Association. This was an increase of 8 per cent over June and 4 per cent over July of last year. Shipments during July dropped 9 per cent below June's record total to 4,532,000 gross; however, this was 10 per cent greater than last year's comparable figure. The excess of production over shipments caused stocks on hand to rise 2 per cent to 9,331,000 gross. Cumulative totals for the first seven months indicate that glass container production is 9 per cent ahead of last year and about equal to 1937's record figure; on the same basis of comparison, shipments are 10 per cent above last year's level and within 3 per cent of 1937.

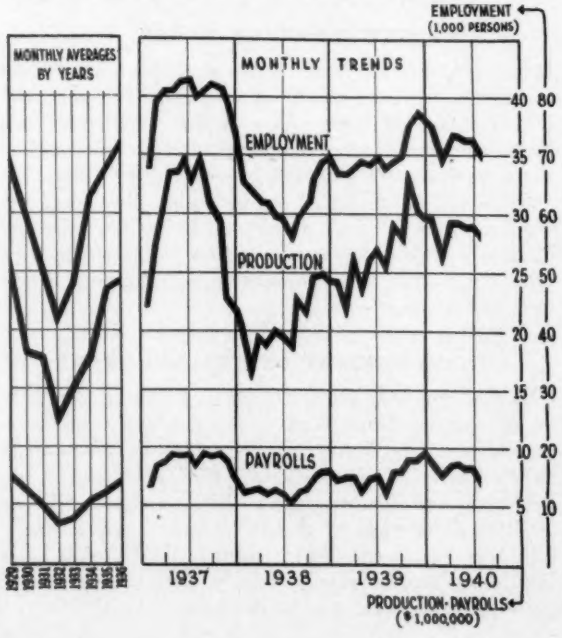
THE GLASS INDUSTRY'S INDEX

Production for Seven Months, January Through July



THE GLASS INDUSTRY'S INDEX

Monthly Trends Through July, 1940



Miscellaneous glass products produced during July were valued at about $9,000,000, according to reliable estimates. This was a decline of 10 per cent from the previous month, but was 15 per cent above last July's total. Satisfactory activity was reported in tableware plants where declines were less than is usual at this season. It is estimated that output of miscellaneous glassware was 15 per cent higher during the first seven months of 1940 than in the comparable period of 1939.

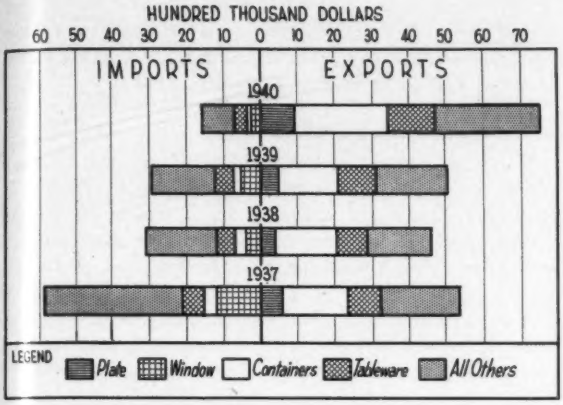
Employment and Payroll: During July approximately 71,400 persons were employed in the glass industry as compared to 73,100 in June. The July figure compares favorably with last year, the same month, when employment was estimated at 67,200 persons.

Payrolls in the glass industry during July were valued at $7,600,000 which was below June's total of $8,200,000. It is estimated that glass manufacturers paid out $57,000,000 during the first seven months of 1940 as compared to $50,000,000 in last year's January to June period.

Foreign Trade: Exports of American glass products during July were valued at $1,184,000, increasing 12 per cent over June. This total compares favorably with July

THE GLASS INDUSTRY'S INDEX

Foreign Trade for Seven Months, January Through July



of last year when these shipments were valued at $731,000. Window glass exports were greater in July than in any month in recent years. They were 160 per cent greater than in June and 18 times last July's figure. Plate glass sales were up 39 per cent over June and 220 per cent over July 1939. Table and illuminating ware exports dropped below the previous month's level, but were well ahead of 1939 totals. Foreign sales of glass products during the January-July period totaled $7,634,000—an increase of 51 per cent over last year. Largest volume gains were noted in plate glass, containers and table ware; here again window glass sales showed a large percentage jump (779 per cent) because of the small volume reported up to a few months ago. The elimination of European supplies from Canadian and Latin American markets is largely responsible for this trend.

Imports of glass products during July were valued at $192,000, which is 4 per cent greater than in June, but 47 per cent less than in July 1939. The declines from last July were greatest in tableware and illuminating ware, although all types of glass products were imported in lesser amounts. Imports during the first 7 months of 1940 amounted to $1,630,000, which was 45 per cent below last year's level. Decreases were noted in all lines with the exception of plate glass. It is reported that although a good share of the current import trade represents withdrawals from warehouses, sizeable shipments arrived from the United Kingdom and Japan.

REMOVAL OF STATIC CHARGES FROM CHEMICAL GLASSWARE

The static charge acquired by chemical glassware when wiped may cause a serious error in weighing the vessel, this difficulty being particularly pronounced during the winter months when the moisture content of the atmosphere is low.

For instance, in the Pregl method for the microchemical determination of carbon and hydrogen, the absorption tubes are wiped with a chamois. This causes a static charge that leaks off so slowly, when the humidity is low, that the time schedule (usually 10 to 15 minutes) between completing a combustion and weighing the absorption tubes cannot be maintained.

F. W. Van Straten and W. F. Ehret state that the charge can be removed by the high-frequency discharge from a device commonly used to detect pinholes in evacuated apparatus. Clement J. Rodden of the Bureau's Chemistry Division has found that if ultraviolet light is used to ionize the air surrounding a glass vessel, the charge can readily be dissipated. In experiments at the Bureau, the vessel was wiped with a dry chamois and was considered to have reached constant weight when the variation was less than 0.05 mg, using a macrobalance. Weighings were made usually after 5-minute interval exposure to the light. In some instances this was reduced to two minutes. As a safe general rule, it is recommended that the wiped article be placed about two feet from either a Hanovia Alpine Sun Lamp or General Electric Lab-Arc, for 10 minutes.—From *The Technical News Bulletin*, U. S. Bureau of Standards, August, 1940.

UNITED STATES FOREIGN TRADE IN GLASS
(Values in Thousands of Dollars)

	1940			1939		Percentage Changes		
	July	June	First seven months	July	First seven months	June-July	July-July	First seven months
EXPORTS								
Plate	202	145	903	63	470	+ 39	+ 220	+ 92
Window	91	35	211	5	24	+160	+1720	+779
Containers	331	292	2488	267	1680	+ 13	+ 24	+ 48
Tableware	195	234	1374	145	1001	− 17	+ 34	+ 37
Illuminating Ware	53	65	396	31	235	− 18	+ 71	+ 69
All Other	312	282	2262	220	1630	+ 11	+ 42	+ 39
Total	1184	1053	7634	731	5040	+ 12	+ 61	+ 51
IMPORTS								
Plate	1	10	109	6	37	− 90	− 83	+194
Window	52	16	272	59	538	+225	− 12	− 49
Containers	13	14	103	22	215	− 7	− 41	− 52
Tableware	26	24	336	80	512	+ 8	− 67	− 34
Illuminating Ware	3	6	43	17	276	− 50	− 82	− 84
All Other	97	115	767	176	1394	− 16	− 45	− 45
Total	192	185	1630	360	2972	+ 4	− 47	− 45

INVENTIONS AND INVENTORS

United States Patents of Interest to the Glass Industry Issued During July.

Raw Materials and Compositions

This department reported last September the issuance of Dr. George W. Morey's Reissue Patent 21,175 which assigned to the Eastman Kodak Co. his rights to the discovery of the value of non-silicate glasses containing the rare oxides lanthanum and tantalum. On July 2, Leon W. Eberlin of Rochester, N. Y. contributed, in patent 2,206,081, some compositions considered to be modifications of those originated by Dr. Morey. These contain boron and thorium in addition to lanthanum and tantalum. Following are typical percentage compositions:

	A	B	C	D
Lanthanum	37.5	36	26.7	22.2
Tantalum	29.2	28	26.7	22.2
Thorium	16.7	16	26.7	22.2
Boron	16.6	20	19.9	33.4

It is assumed that the expense of such compositions would not be excessive for uses where their exceptional optical characteristics could be utilized. This patent was also assigned to Eastman Kodak Co.

Maurizio Korach and Antonino Dal Borgo of Veggia, Italy, patented a "dry method" of making plate-like glass shapes by depositing the glass-forming constituents upon a support having the desired shape, and then fusing them to produce a permanent form having the same shape as the support. The patent 2,208,034 gives type compositions for the three important elements (1) the ware support, (2) the glass composition, and (3) a refractory separating layer or engobe which keeps the glass from sticking to the support. The support may be made of a high alumina or clay refractory and if properly prepared may be used in as many as 200 firings. The engobe should be a highly refractory layer, such as would be formed by mixing fused alumina with a small amount of clay. For a firing temperature of 900 deg. C., the following glass composition, given on a molecular weight basis, might be used:

$$\left.\begin{array}{l} 0.50\ PbO \\ 0.10\ BaO \\ 0.15\ (Ca, Mg)\ O \\ 0.25\ (K, Na)\ O \end{array}\right\} 0.23\ Al_2O_3 \left\{\begin{array}{l} 3.50\ SiO_2 \\ 0.40\ SnO_2 \\ 0.22\ B_2O_3 \end{array}\right.$$

Furnaces

In glass melting furnaces in which the heating is accomplished by the resistance of the glass batch to the passage of electric current, considerable difficulty is experienced due to the burning of the graphite electrodes which extend through the furnace wall into the glass. Such combusion will occur wherever the electrode is exposed to the air at temperatures of about 1400 dg. F. or higher. The inner end of the electrode is covered by glass and thereby protected from the air, but combustion may occur on that part of the electrode which is within the wall. In patent 2,209,515 assigned to Pittsburgh Plate Glass Co. by Roy G. Ehman of Brackenridge, Penna., and Harry F. Hittner of Oakmont, Penna., it is proposed to protect the electrode by partially encasing it in a steel tube or sleeve. The tube is secured and sealed to the outer end of the electrode and extends far enough toward the hot face of the furnace wall to allow an inner seal to be formed by molten glass.

Feeding, Forming and Shaping

Hartford-Empire Co. was assignee of patent 2,207,676 which represents the invention by Walter K. Berthold, Rockville, Conn., of adapting units which allow the formation of "purely pressed" glassware on the Hartford Individual Section Machine initially described in H. W. Ingle's patent 1,911,119 of May 23, 1933. It is stated that by the Berthold method the machine can be changed from the production of blown narrow neck ware to the production of purely pressed ware in normal job-change time.

Another Hartford-Empire patent was 2,209,018, issued July 23 to Karl E. Peiler, for a glass charge delivery apparatus, which receives the charge in a tube offset laterally from the mold and allows it to fall, but imparts a lateral movement to the charge, so that it falls into the mold in a centrally aligned manner. Inclined chutes or troughs commonly used may distort the charge and allow it to come into unequal contact with the mold walls and thus to be unequally cooled.

Thomas D. Saunders, Dunbar, W. Virginia, received two glassware mold patents 2,209,936 and 2,209,937 which he assigned to the Dunbar Glass Corporation.

Patent 2,208,958 granted to Carl A. Brown, Chardon, Ohio, and Frank B. Van Sickle, Lyndhurst, Ohio (General Electric Co.) concerns an apparatus for bending glass tubing. The machine automatically bends short lengths of tubing or rods to a desired curvature.

Decoration

A fully automatic machine for stenciling vitreous enamel decorations on bottles and other glassware was patented by John E. McLaughlin, Alton, Illinois, and Albert S. Jackson, Wood River, Illinois. This is patent 2,207,351, assigned to Owens-Illinois. The enamel composition is applied by a squeegee through a stencil screen. One element of interest is an automatic orienting mechanism which cooperates with the mold seams to align the bottle properly for receiving the color.

Another decorating machine is that of patent 2,206,686, assigned by Thomas S. Bauman, Lancaster, Ohio, to Classic Glass, Inc., Columbus, Ohio. The pattern to be transmitted to a bottle or tumbler is carried on impression rolls which are wetted with viscous linseed oil or varnish, or other base suitable for serving as a carrier for the color. This impression is transferred to the tumbler, leaving a film of oil where the color is to be applied. The fusible ceremic color is then applied as a dust which will naturally adhere to the glass only where it has been previously wetted by the oil.

Robert S. Davis of Parkersburg patented a decorating machine for stencilling an article having a protuberance which is received in a slot in a chuck, so that the article is in a proper position when the design is applied by

stencil. This is patent 2,209,688, assigned to Solar Laboratories, Beaver, Penna.

Patent 2,207,585 granted to Lester R. Gasper covers a novel means of decorating a transparent glass plate. To give the effect of numerals or other decorations extending entirely through the plate, those placed on the front surface are repeated in slightly larger size on the back in somewhat lighter coloring.

Miscellaneous Processes

Libbey Glass Co. received two patents for transfer apparatus for removing tumblers from a moile burn-off machine to an annealing lehr. These were 2,206,267 which issued to Harold R. Schutz and Jesse H. Treece, and 2,207,179 to Carl W. Schreiber. An objective of the latter invention was to replace the manual operation of uprighting the inverted tumblers as they come from the burn-off machine, and at the same time to eliminate the gravity principle by which this operation has sometimes been accomplished mechanically. Fig. 1 shows, to the left of the letter T, a peg 44 which has just discharged a tumbler into a transfer cup 46, which rides on a titled table so as to discharge the tumbler at a higher level onto the cross-conveyor 48 leading to the lehr.

James Bailey, West Hartford, Connecticut, (Hartford-Empire) received patent 2,207,426 for an apparatus for preparing resin type plastics for use.

Patent 2,207,929 granted to Henry L. Meyer of Kansas City, Missouri, covers an improved holder for use with bifocal lens blanks during the fusing operation.

The American Optical Co. received through assignment, Albert E. Maynard's (Southbridge, Mass.) patent 2,209,605 for a lens edging machine.

Andrew J. McCann of New York received patent 2,209,701 for a device for cutting or scoring necks of bottles.

Fig. 2 indicates the nature of the apparatus for glazing glassware which issued as patent 2,209,252 on July 23 to Chas. T. Stewart of Newark, Ohio, and Chas. O. Stewart of Chicago. This patent was assigned to the Glapat Corp., Zanesville, Ohio. Preferably the apparatus fire glazes the inside while cooling the outside, and then in turn applies a flame to the outside while cooling the inside. The cooling is to prevent distortion. The machine comprises an endless conveyor, moving in a horizontal plane, which carries spindles which support the ware. In the particular operation shown a tumbler has reached a situation where it is receiving an inside polish or glaze from a gas burner 91a, while the outside of the ware is being cooled by air transmitted through blowers 104.

An improved method of making so-called side arm laboratory glass ware was patented by Wm. T. Levitt, Needham, Mass. This patent, 2,206,816 assigned to Tamworth Associates, Inc. of Needham, provides for markings on the female cone of a ground glass joint to aid the glass blower in locating the point at which the hole for the side arm is to be located.

Plate and Sheet Glass

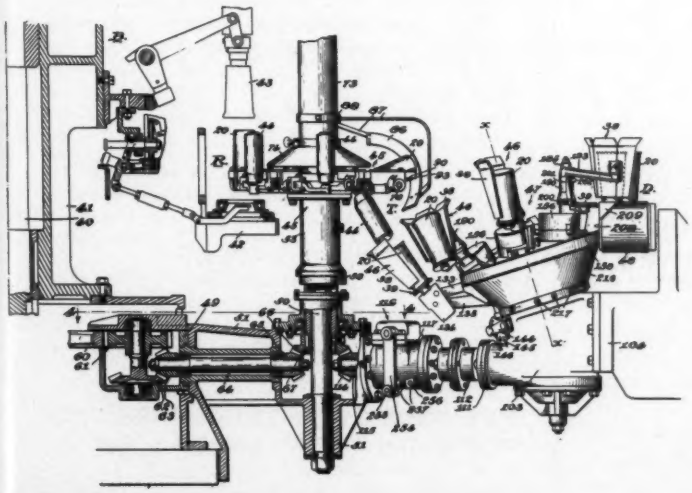
George B. Watkins and Joseph D. Ryan, Toledo, assigned to Libby-Owens-Ford Glass Co., their patent 2,209,435 for a new laminated safety glass structure. This is described as comprising two sheets of glass and a middle layer of cellulose acetate plastic bonded to the sheets with an adhesive formed from the condensation products of partially hydrolyzed polyvinyl acetate and formaldehyde, plasticized with an ester of phthalic acid compatible with both the adhesive and the plastic.

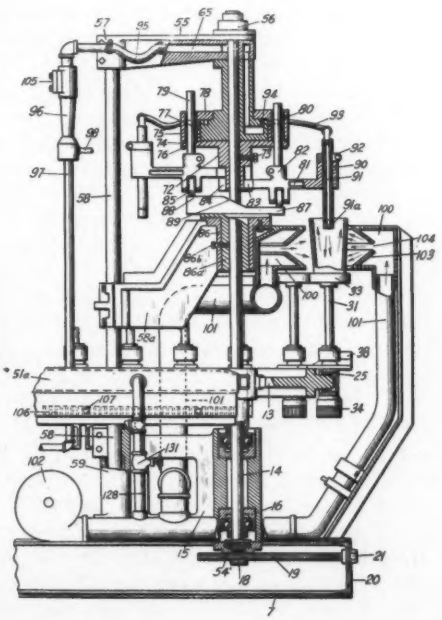
Patent 2,209,505, representing an apparatus for surfacing plate glass and issued to Ralph D. Bole and Emil A. Fusca, Pittsburgh, was assigned to Pittsburgh Plate Glass Co.

Glass Blocks

Harold L. Eastus, Muncie, Indiana (Owens-Illinois) received patent 2,207,342 for a tool for aligning the two halves of a glass block for sealing together.

Fig. 1. (Below) 2,207,179: Schreiber, Libbey Glass Co. Apparatus for transferring tumblers from a moile burn-off machine to an annealing lehr.
Fig. 2. (Right) 2,209,252: Stewart. Machine for fire-glazing both the inside and outside of the tumblers.





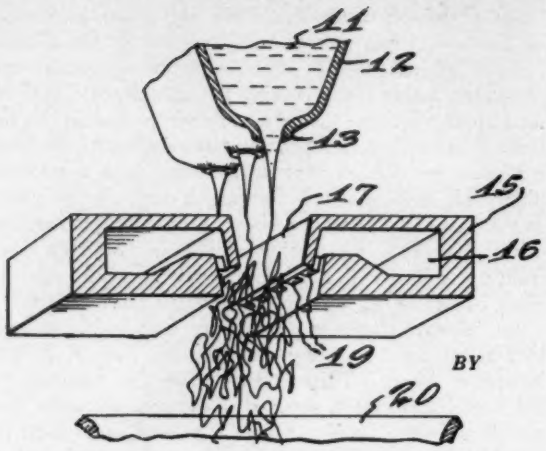


Fig. 3. 2,206,058: Slayter and Thomas, Owens-Corning Fiberglas Corp. Jets 16 blow the glass streams acutely from both sides to produce a whipping of the fibers, in forming glass wool.

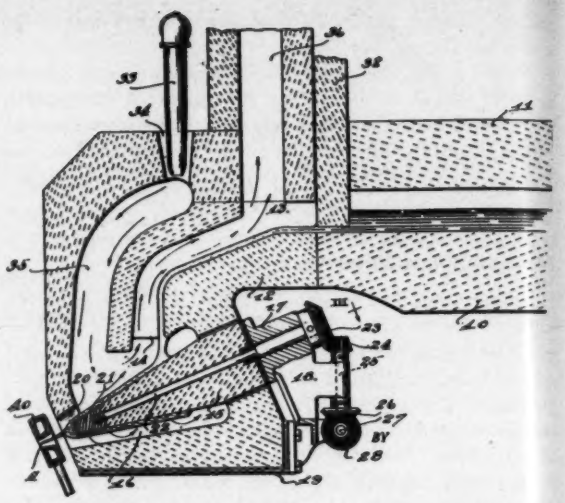


Fig. 4. 2,207,764: Soubier, Owens-Corning Fiberglas Corp. In forming glass fibers, glass is spun upon the mandrel 15 from which it is drawn by the steam jet A to form fibers.

Glass Wool and Fiber

Each of the six patents in the following group was assigned to Owens-Corning Fiberglas Corp.

The varied effects to be obtained by slightly altering the blast action in forming glass wool or mineral wool can be appreciated only by those who have worked with these processes. For example, Games Slayter and John H. Thomas in patent 2,206,058 reveal that by directing two acutely opposing steam jets at each other from either side of the glass stream, the fibers are whipped about and given a length about eleven times that which would be anticipated by the speed of the blast. In other words the fibers are not pulled by the blast, but are whipped up by it. This is, of course, highly desirable for fibers to be used in glass wool. They are finer and more thoroughly tangled together. The whipping action is indicated by Fig. 3.

Slayter's patent 2,206,060 is an arrangement aimed at the tendency of the fine glass streams to ride on top of the steam blast without entering it until there is an appreciable accumulation. This was found to be avoided by adopting such a pattern of steam jets as would provide quiescent zones between the jets. The molten glass readily enters the blast region through these zones.

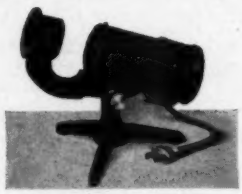
Leonard D. Soubier's July contribution to the glass fiber patent art, was patent 2,207,764 which provides means for flowing a stream of molten glass against a rotating mandrel, from which it is drawn by a blast jet which reduces it to fine threads. The apparatus is illustrated in Fig. 4.

Patent 2,208,897 granted to Stuart M. Dockerty of Corning, N. Y. and Otis W. Wiley of Port Alleghany, N. Y. describes a means of depositing glass fibers to form an insulating covering for electrical conducting wires. The fibers formed by blowing glass streams, accumulate on a screen-surfaced drum to which they are held by vacuum until they are drawn off to a hollow tapered spindle through which a conducting wire is passed. The fibers pass continuously from the smaller end of the cone shaped spindle to the wire.

Games Slayter patented (2,206,059) a glass fiber felt for covering pipes and other articles, which is characterized by the presence of long fibers parallel to the face of the mass, and shorter fibers throughout the mass interfelted with the longer fibers to give a more coherent product.

According to patent 2,209,850 granted to Errol B. Shard and James F. Hyde of Corning, N. Y., high-quality dielectric material is made by coating textile fibers with an insulating substance, fabricating the fibers into the desired form and then impregnating them with another insulating substance.

Polaroid Strain Testing



THE PORTABLE

This compact portable glass inspection polariscope weighing less than two pounds offers the same high precision obtained in larger Polaroid Strain Testing Units. Works on 110 volts a.c. or d.c., 1" eye piece, 1¾" polarizing field. Tripod is removable so that polariscope can be carried in briefcase.

Especially adapted for examination of glass objects such as tubing up to 1" diameter or lenses and other flat areas up to 2 inches.

An indispensable utility instrument for

Sales executives
Service men
Laboratory work
Branch offices

Write for full details to

THE POLARIZING INSTRUMENT CO.
630 Fifth Ave. (Rockefeller Center) **New York City**

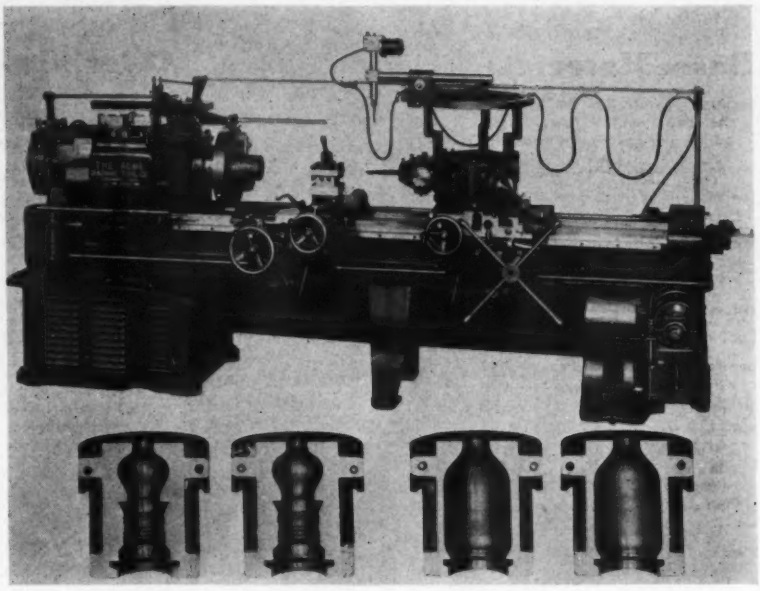
NEW EQUIPMENT AND SUPPLIES

UNIVERSAL DUPLICATOR

The Detroit Universal Duplicator Company, 257 St. Aubin Street, Detroit, Mich., is now manufacturing a control unit to be mounted on Acme Turret Lathes for production manufacture of glass bottle molds. The control mechanism actuates the cross slide of the turret to move the boring bar in conformity with a metal outline template which conforms to the shape of the finished mold.

In operation, the two mold halves are clamped together in the lathe by means of a special chucking device. After facing one end, the operator moves the turret mounted boring bar up to the starting position and then starts the duplicating mechanism. When the internal cut is completed, the work is removed and reversed in the lathe to complete the mold by facing the opposite end. The template for contour boring is mounted on the head of the lathe; the tracer head is mounted on the turret and the tracing finger follows the template and transmits a series of interrupted electric impulses to the control unit which, in turn, actuates the cross feed of the boring bar in exact conformity with the template. A solenoid actuated clutch, operating from the tracer head, and mounted on the cross slide feed, provides an exceptionally fine control for the feed of the cutting bar.

It is stated that this is accomplished with such accuracy that in addition to the savings in actual production time, mold costs are further reduced through the savings in time required for polishing and burnishing. The molds at the bottom of the illustration are examples of the close control possible with the solenoid clutch and the possibility of stopping the operation at any time without gouging the work.



Detroit Universal Company's Mold Duplicator

REEVES VARI-SPEED JR.

The Reeves Pulley Company, Columbus, Ind., has recently announced the addition of the Vari-Speed Jr. to its line of variable speed control equipment. The unit, as standardly furnished, comprises a disc assembly and adjustable motor base. The disc assembly consists of two cone-shaped discs, a self-adjusting tension spring, a spring adjusting nut and cover. This assembly is applied directly to the standard shaft extension of the motor and the motor is mounted on an adjustable base. The V-belt, driving between the two discs, and the sheave pulley on the driven shaft, is a standard section "A" or "B" belt, and may be secured from any industrial supply house.

The Vari-Speed Jr. is built in six different sizes of disc assembly, for use with motors of from 1/8 to 1½ hp. and provides speed control over a range of from 1¾ : 1 to 2¾ : 1, inclusive, depending upon the size, hp. and speed of unit selected. Two sizes of motor bases are available, according to the size of motor. Either size base may be used with any one of the six disc assemblies. The unit is also available in a countershaft type for requirements of either unusual speed reduction or speed increase.

CATALOGS RECEIVED

Pangborn Corporation, Hagerstown, Md. A new series of six direct mail pieces which will back up the next six months trade journal advertising of Airless Rotoblast Barrels, Tables and Special Machines.

Kirk and Blum Mfg. Co., Cincinnati, Ohio. "Industrial Ovens," a new 24-page book just issued, illustrating and describing gas-fired and electric industrial ovens.

Jeffrey Manufacturing Co., Columbus, Ohio. A new folder on Bucket Loaders for handling crushed stone, sand and gravel.

Brown Instrument Co., Philadelphia, Pa. Catalog No. 6705, describing the complete line of Circular Case Thermometers and Pressure Gauges.

Eisler Engineering Co., Newark, N. J. Two folders on equipment of interest to laboratory and plant men. A new Horizontal Butt Sealing and general glass working lathe, and a compact laboratory unit suitable for colleges or research laboratories.

Industrial Gloves Co., Danville, Ill. A new catalog of safety clothing by the makers of the Steel-Grip Safety Clothing line, showing industrial safeguards from a line of more than 3800 items.

Durakool, Inc., Elkhart, Ind. A bulletin describing their new Mercury Relay incorporating an unbreakable metal body and the displacement principle with solenoid actuation and the contact structure hermetically sealed.

OSCAR F. ZEILLER RETIRES

After 53 years of uninterrupted service to the Corporation, Mr. Oscar F. Zeiller retired on July 1 as vice president of B. F. Drakenfeld and Company. He is succeeded by his son, Irwin F. Zeiller, secretary of the company. On July 1, the Board of Directors appointed Harold D. Miller to the post of secretary, and James Moriarity as assistant.

JOINS SURFACE COMBUSTION

Harold A. Moore, for many years connected with the engineering department of the Amsler-Morton Co., Pittsburgh, has recently joined the organization of the Surface Combustion Co., Toledo, Ohio. As with his former connection, Mr. Moore will handle problems of glass plant engineering, particularly in the field of annealing.

CATALOG & BULLETIN SERVICE

Current catalogs and manufacturers' service bulletins reviewed in this department may be obtained by writing to THE GLASS INDUSTRY.

CURRENT PRICES OF GLASS-MAKING MATERIALS

FURNISHED BY PRODUCERS, MANUFACTURERS AND DEALERS

Base Materials

		Carlots	Less Carlots
Barium carbonate ($BaCO_3$), Crude, (Witherite) 90%, 99% through 200 mesh	ton	46.00	43.00
Reduction on precipitated material, $5.00 a ton			
Barium sulphate, in bags	ton	19.00	24.00
Barium sulphate, glassmaker's, carlots, bulk f. o. b. shipping point	ton	15.00-16.00	18.00
Borax ($Na_2B_4O_7 10H_2O$)	lb.	....	....
Granulated	In bags, lb.	.0215	.027-.0295
Powdered	In bags, lb.	.024	.0295-.032
Boric acid (H_3BO_3) granulated	In bags, lb.	.048	.054-.0565
Calcium phosphate ($Ca_3(PO_4)_2$)	lb.	.07	.07½
Cryolite ($Na_3Al F_6$) Natural Greenland (Kryolith)	lb.	.0865-.0875	.0925
Synthetic (Artificial)	lb.	No supplies available.	
Feldspar— (published list prices)			
20 mesh	ton	11.00-13.25	
40 mesh	ton	11.50-13.75	
Granular	ton	11.75-14.00	
Semi-granular	ton	11.00-13.25	
L. C. L., (Min. 2 tons) $3.00 per ton additional plus charge for bags			
Fluorspar (CaF_2) domestic, ground, 96-98% (max SiO_2, 2½%)			
Bulk, carloads, f. o. b. mines	ton	30.00-31.00	....
In bags	ton	31.60-32.60	42.00-45.00
Kryolith (see Cryolite)			
Lead Oxide (Pb_3O_4) (red lead) (N. Y.)	lb.	.074	....
In 5 Ton lots	lb.	....	.0775
Less than 5 Tons	lb.	....	.0825
Lime—			
Hydrated ($Ca(OH)_2$-MgO) (in paper sacks)	ton	8.50	8.50
Burnt (CaO-MgO) ground, in bulk	ton	7.00	....
Burnt, ground, in paper sacks	ton	9.00	9.00
Burnt, ground, in 180 lb. drums	Per drum	1.60	1.70
Kiln Dried ($CaCO_3$-$MgCO_3$) 10x30 mesh	ton	1.75	....
Kiln Dried ($CaCO_3$-$MgCO_3$) 16x120 mesh	ton	1.75	....
Nepheline Syenite, f. o. b. shipping point	ton	12.50	14.50
Potassium carbonate—			
Calcined (K_2CO_3) 96-98%	lb.	.065	.0675
Hydrated 80-85%	lb.	.055	.0575
Salt cake, glassmakers (Na_2SO_4)	ton	18.00-20.00	25.00
Soda ash (Na_2CO_3) dense, 58%—			
Bulk	Flat Per 100 lb	.95	....
In barrels	Per 100 lb.	1.35	....
In bags	Per 100 lb.	1.10	....
Sodium nitrate ($NaNO_3$)—			
Refined (gran.) in bbls.	Per 100 lb.	....	2.50-2.90
95% and 97%			
Bulk	Per 100 lb.	1.35	....
200 lb. bags		1.415	1.44
100 lb. bags		1.45	1.475

Special Materials

		Carlots	Less Carlots
Aluminum hydrate ($Al(OH)_3$)	lb.	.026-.029	.04
Aluminum oxide (Al_2O_3)	lb.	.07	.09
Antimony oxide (Sb_2O_3)	lb.	.14	.14½
Arsenic trioxide (As_2O_3) (dense white) 99%	lb.	.03¼	.03¾
Barium nitrate ($Ba(NO_3)_2$)	lb.	....	Open price.
Pyrophyllite, (20% Al_2O_3)	ton	9.00	12.00
Sodium fluosilicate (Na_2SiF_6)	lb.	.08¼	.08½-.09
Tin Oxide (SnO_2) in bbls.	lb.	....	.54
Titanium Oxide (ceramic grade)			
In bags	lb.	.12	.12¼-.12¾
In barrels	lb.	.12¼	.12½-.13
Zinc Oxide (ZnO)			
American process, Bags	lb.	.06¼	.06½
White Seal, 150 lb. bbls.	lb.	.08¼	.09
Green Seal bags	lb.	.08	.08¼
Domestic White Seal bags	lb.	.08½	.08¾
Red Seal, bags	lb.	.07½	.07¾
Zircon			
Refined Granular (Milled .01-.02 higher)		.06½	07-08

Coloring Materials

		Carlots	Less Carlot
Barium selenite ($BaSeO_3$)	lb.	....	1.40-1.60
(Commercial, 25% Selenium)	lb.	....	.85
Cadmium sulphide (CdS)	lb.	....	1.00-1.05
Cerium hydrate—			
100 lb. drums and 600 lb. barrels	lb	....	.60
Chrome Oxide Green, 400 lb. bbls.	lb.	....	.22-.25
Chromite (99% through 200 mesh)	ton	41.00	45.50
Chromite ore (air floated)	ton	55.00	58.00-73.00
Cobalt oxide (Co_2O_3)			
In bbls.	350 lbs. or more, lb.	....	1.84
	Less than 350 lbs., lb.	....	1.94
Copper oxide—			
Red (Cu_2O)	lb.	....	.165
Black (CuO)	lb.	....	.18-.19
Black prepared	lb.	....	.22
Iron Oxide—			
Red (Fe_2O_3)	lb.	....	.05-.08½
Black (Fe_3O_4)	lb.	.04½	.09
Iron Chromate	lb.	....	.035-.05
Lead Chromate ($PbCrO_4$) in bbls.	lb.	....	.145
Manganese, Black Oxide			
In Paper bags	ton	65.00	68.00
In Burlap bags	ton	66.75	69.75
In Casks	ton	69.00	72.00
Neodymium oxalate, 50 lb. drums	lb.	....	3.50
Nickel oxide (Ni_2O_3), black	lb.	....	.35-.40
Nickel monoxide (NiO), green	lb.	....	.35-.37
Potassium bichromate ($K_2Cr_2O_7$)—			
Crystals and Granular	lb.	.08¾	.09-.09¼
Powdered	lb.	....	.09¾-.09¾
Potassium Chromate (K_2CrO_4) 100 lb. kegs	lb.	....	.27
Powder blue	lb.	....	.19-.24
Rare earth hydrate—			
100 lb. drums	lb.	....	.35
325 lb. barrels	lb.	....	.30
Selenium (Se) In 100 lb. lots	lb.	....	1.75
In lesser quantities	lb.	....	1.85
Sodium bichromate ($Na_2Cr_2O_7$)	lb.	.06¾	.07-.07¼
Sodium chromate (Na_2CrO_4) Anhydrous	lb.	.08¼	.08¾-.08¾
Sodium selenite (Na_2SeO_3)	lb.	....	1.50-1.65
Sodium uranate (Na_2UO_4) Orange	lb.	....	1.75-1.85
Yellow	lb.	....	1.75-1.85
Sulphur (S)—			
Flowers, in bbls.	Per 100 lb.	3.35	3.70-4.10
Flowers, in bags	Per 100 lb.	3.00	3.35-3.75
Flour, heavy, in 250 lb. bbls.	Per 100 lb.	2.90	3.25-3.65
Uranium oxide (UO_2) (black, 96% U_3O_8) 100 lb. lots. Black	lb.	....	2.65-2.75
Yellow orange	lb.	....	1.75-1.85

Polishing Materials

		Carlots	Less Carlots
Emery, Turkish	lb.	.063	.07
Pumice Stone,			
American Ground Italian FFF, FF, F	lb.	....	open price
0, 0½, ½, 1.	lb.	....	open price
Putty Powder	lb.	Open price.	
Rotten Stone, (Domestic)	lb	.02¼	.03½
Rouge, Red	lb.	...	.16
Black	lb.	....	.18

You don't KNOW the game until YOU'VE PLAYED IT

There's more to glass colors than you can find in a book, too

• A handbook may tell you the technique of getting from one end of the field to the other — but you never really *know* how it's done until you've done a bit of broken field running yourself.

The same thing applies to the development of colors and chemicals for glass.

Our technologists make use of every scientific means to find facts about Drakenfeld colors and chemicals that will make your production easier, more economical. *But, they also know that laboratory knowledge must be backed up by the human experience that comes only of actual work in the field.* It's this "know-how," this ability to predict results on the basis of what they've seen happen in lehrs and spraying rooms, that gives added importance to Drakenfeld research.

We've been playing the game for over seventy years, and though we always keep our laboratory eye on the future, you'll find that our past experience will be equally helpful to you in ironing out your production problems. When we say, then, that Drakenfeld technologists will be glad to help you without obligation, we also mean that they'll give you latest laboratory findings — *plus* the practical knowledge that comes of long experience. Why not drop us a note the next time you run into a production problem that looks like a tough one?

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SYMPOSIUM ON GLASS

As announced in the August issue of the GLASS INDUSTRY, the American Chemical Society will hold a symposium on Glass, at its Detroit convention, Tuesday afternoon, September 10. Since the announcement last month, additional papers have been added to the program. These are as follows: Dr. B. S. Warren of the Massachusetts Institute of Technology will talk on X-ray studies; Dr. M. L. Huggins of the Eastman Kodak Company will give a paper on additive properties; Dr. G. W. Morey of the National Geophysical Laboratory will speak on the physical characteristics of glass; Dr. H. R. Moulton of the American Optical Company will discuss optical developments and Dr. H. H. Blau of the Corning Glass Works will conclude the symposium with a talk on chemical developments.

NEW BROCKWAY PLANT UNDER WAY

At Crenshaw, Pa., about two miles east of Brockway, work is being pushed on the buildings for the new production unit of the Brockway Glass Co. The main building of the new plant will be 100 ft. wide by 625 ft. long, constructed of structural steel and corrugated iron siding, with concrete floors. A completely new melting tank with a melting capacity of approximately 70 tons per day will be of the side-port regenerative type and will be fired with natural gas. It is expected that the forming equipment will include two Hartford-Empire and three Lynch machines, while Hartford-Empire feeders, stackers and lehrs will also be used. The new batch house will be furnished with raw material bins of the concrete silo type, and modern equipment for the preparation and transportation of the batch will be installed. A warehouse will be located alongside a spur track from the Erie Railroad. The new plant may be in production around the first of the coming year.

• The State Department of Commerce and Industry has made a survey of the possibilities for glass bottle manufacture in that state, which it has published as the April issue (Vol. 3, No. 4) of Louisiana Commerce and Industry. The survey is quite comprehensive. Copies may be obtained by addressing Ernest Lee Jahncke, Executive Director of the Department, at Baton Rouge.

I.E.S. CONVENTION SEPT. 9

The Illuminating Engineering Society will hold its annual meeting September 9 to 12 at the Essex and Sussex Hotel, Spring Lake, N. J. A most interesting program has been arranged, details of which may be secured by writing to the general offices of the Society at 51 Madison Avenue, New York. After the convention closes on Thursday, members will visit the World's Fair, where I.E.S. Day will be officially recognized on Friday.

• An unofficial report from the Surgeon General's office states that the only glass item required by the Medical Corps of the U. S. Army that it cannot yet obtain in the United States is the small cover glasses used on microscope slides. The War Department has an ample supply on hand for present needs, and is concerned only with the future. It is reported that both Pittsburgh Plate Glass and The Corning Glass Works are working to produce the item, which was formerly obtained from Germany.

Hit or miss methods of selecting soda ash, caustic potash and other alkalies you require for glass making have gone out of date.

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CORNING LABORATORY NEARS COMPLETION

Work on the new four-story laboratory building of the Corning Glass Works is rapidly nearing completion, and several of the research departments already have moved into their new home. Air conditioning and painting of the interior has been completed throughout and the laying of asphalt tiling on floors is about the only important work remaining to be done.

The building occupies the site of the two buildings that originally constituted the Corning Glass Works, which incidentally instituted the first laboratory staff for a glass works in America. An interesting feature is that the corner stone is made of Pyrex glass.

J-M ANSWERS NATIONAL DEFENSE CALL

More than 110 Johns-Manville employees in various plants and offices left on August 5 for three weeks military or naval training in connection with the government's national defense program, company officials announced recently.

In accord with Johns-Manville's basic policy to support national defense by full cooperation with Army, Navy or Marine Corps authorities in the training of reserve or inactive personnel, the company will make up the difference in pay between what the government pays these men and what they would have earned if they had remained at work.

The Red Cross ambulance which the Glass Container Association purchased and sent to England. Underneath the name of the British War Relief Society, Inc., United States of America, a brass plaque has since been placed bearing the legend: Glass Container Association of America Ambulance.

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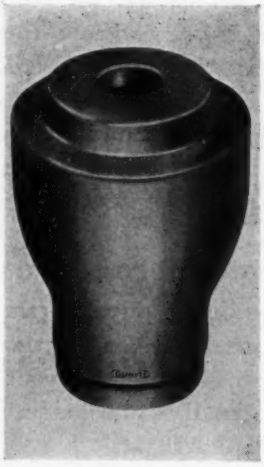

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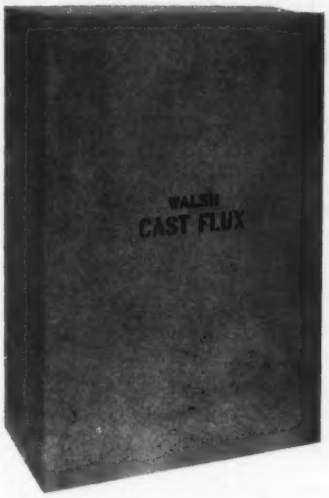

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